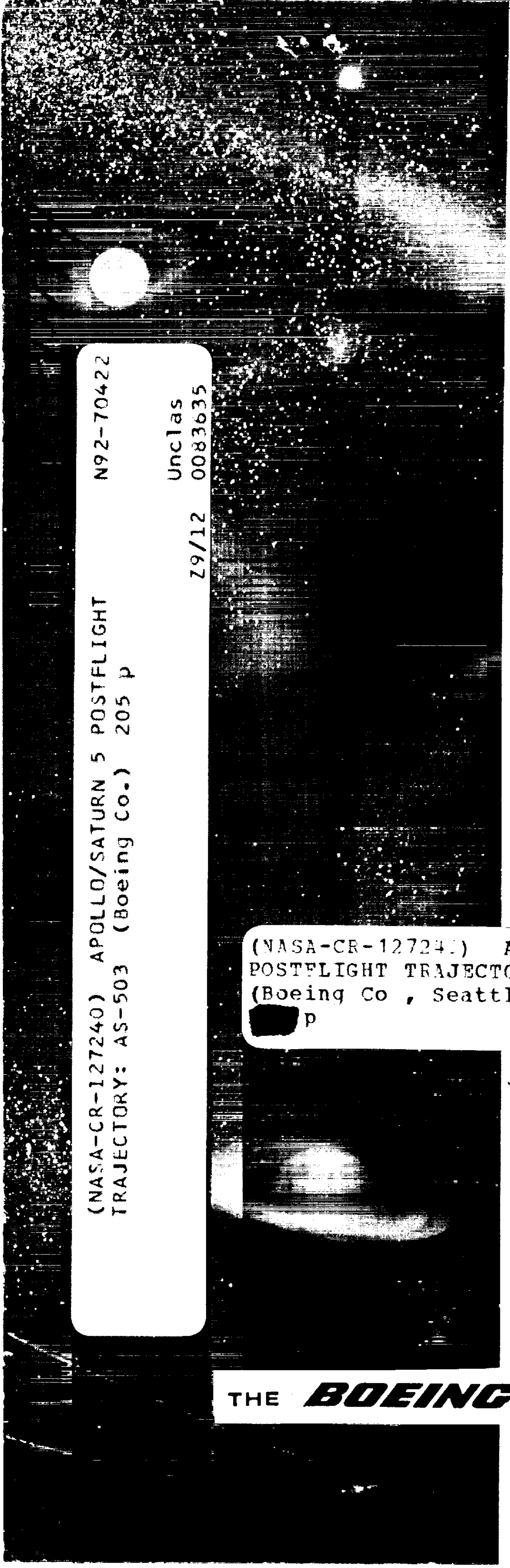

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POSTFLIGHT TRAJECTORIES

February 19, 1969

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FLIGHT SYSTEMS ANALYSIS

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REVISIONS

REV. SYM	DESCRIPTION	DATE	APPROVED

ABSTRACT AND LIST OF KEY WORDS

This document presents the postflight trajectory for the Apollo/Saturn V AS-503 flight. Included is an analysis of the powered flight trajectory, orbital trajectory of the vehicle, the free flight trajectories of the expended S-IC and S-II stages, and the post separation trajectory of the S-IVB/IU. Trajectory dependent parameters are provided in earth-fixed launch site, geocentric inertial and geographic polar coordinate systems. The time history of the trajectory parameters is presented from guidance reference release to the physical separation of the CSM from the S-IVB/IU.

Tables for engine cutoff, stage separation, orbital insertion, and translunar injection conditions are included in this document. Figures of such parameters as altitude, surface and cross ranges, and magnitudes of total velocity and acceleration as a function of range time for the powered flight trajectory are presented.

The following is a list of key words for use in indexing this document for data retrieval:

Apollo/Saturn V
AS-503
Postflight Trajectory
Powered Flight Trajectory
Orbital Trajectory
Free Flight Trajectory
Post Separation Trajectory

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4. Boeing Memorandum 5-9600-H-181, "Postlaunch Saturn V AS-503 C' Predicted Operational Trajectory (SSR-237)," December 22, 1968.
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PREFACE

The analyses presented in Sections 1 through 5 of this document were conducted by the following Boeing personnel in collaboration with Messieurs J. Haussler, L. Lofton, and C. Varnado of the R-AERO-FFT Section of MSFC:

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The analysis presented in Section 6 of this document was conducted by the following MSFC personnel of the R-AERO-F Division and is included for completeness in terms of spent stage trajectories.

J. Haussler
R. Benson
D. McFadden

SOURCE DATA PAGE

The following listed government-furnished documentation was used in the preparation of this document:

Exhibit FF Line Item Number	GFD Title	Date Received
R-AERO-P-#35c	OMPT Format	12/20/68
R-AERO-P-#17	Tracking and Network Specifications	12/20/68
R-AERO-P-#35b	Transponder Locations	12/20/68
I-MO-#4c	Six Seconds Raw Radar	12/21/68
DRL-20F	Operational Trajectory Certified Data	12/22/68
I-MO-#4e	Meteorological Data (Preliminary)	12/22/68
I-MO-#4a	Insertion Point and/or Orbital Elements	12/22/68
I-MO-#6	IP Raw MP	12/22/68
I-MO-#18a	Preliminary Guidance Velocities	12/22/68
I-MO-#4f	Meteorological Data (Final)	12/28/68
I-MO-#4c	Six Seconds Raw Radar (Hawaii)	12/30/68
I-MO-#9	Pulse Radar	1/2/69
I-MO-#17a	Preliminary Significant Time of Events	1/3/69
I-MO-#9	Pulse Radar (Hawaii)	1/4/69
I-MO-#9	Pulse Radar (Bermuda)	1/8/69
I-MO-#17c	Final Significant Time of Events	1/9/69
I-MO-#18c	Orbital Venting Acceleration Data Cards	1/10/69
I-MO-#9	USB Data	1/16/69

Data not covered by Exhibit FF:

GFD Title	Date Received
Q/L ODOP (PVA)	12/22/68
Q/L Significant Time of Events	12/23/68
Preliminary Trajectory	12/24/68
Optical Tracking	1/9/69

SECTION 1

SUMMARY AND INTRODUCTION

The Apollo/Saturn V AS-503 vehicle was launched from Launch Complex 39, Pad A at the Kennedy Space Center on December 21, 1968, at 7:51:00 A.M. Eastern Standard Time (Range Time Zero) at an azimuth of 90 degrees east of north. Range time, which is referenced to Range Time Zero, is used throughout this document unless otherwise specified. Guidance reference release (GRR) was established to have occurred at -16.97 seconds. First motion occurred at 0.33 second. At 12.11 seconds, a roll maneuver was initiated orienting the vehicle to a flight azimuth of 72.124 degrees east of north. This flight azimuth, dependent on the launch time, launch day and month, is calculated using polynomial coefficients taken from the guidance presettings in order to achieve the desired translunar targeting parameters. The translunar targeting parameters are functions of the moon position, earth parking orbit inclination, earth-moon distance, and moon travel rate.

The vehicle performed nominally throughout the entire flight. The vehicle was inserted into a parking orbit at 694.98 seconds at an altitude of 191.36 km (103.33 n mi) and a total space-fixed velocity of 7,792.84 m/s (25,567.06 ft/s). The vehicle remained in orbit for approximately one and one-half revolutions. Near the middle of the second revolution, at 10,229.51 seconds, the restart of the S-IVB stage occurred. At 10,565.51 seconds, the vehicle was injected onto a free-return circumlunar trajectory at an altitude of 346.73 km (187.22 n mi) and a total space-fixed velocity of 10,822.05 m/s (35,505.41 ft/s). At 12,059.3 seconds, the spacecraft (CSM) separated from the launch vehicle. Separation occurred at an altitude of 7,033.48 km (3,797.78 n mi) and a total space-fixed velocity of 7,612.35 m/s (24,974.90 ft/s). Following S-IVB/CSM separation, the vehicle maneuvered to a slingshot attitude frozen relative to local horizontal. The retrograde velocity to achieve S-IVB/IU lunar slingshot was accomplished by a LH_2 vent, a LOX dump, and APS ullage burns. The S-IVB/IU closest approach of 1,262 km (681 n mi) above the lunar surface occurred at 69.982 hours into the mission.

The impact location of the expended S-IC stage was determined to be 30.20 degrees north latitude and 74.11 degrees west longitude at 540.41 seconds. The impact location of the expended S-II stage was determined to be 31.83 degrees north latitude and 37.28 degrees west longitude at 1,165.11 seconds.

Section 2 of this document defines the coordinate systems and launch parameters used for the postflight trajectory analysis.

(Continued)

The postflight mass-point trajectory related parameters and analytical procedures are presented in Sections 3, 4, 5, and 6. The trajectory is divided into six phases:

a. Ascent Phase
b. Orbital Phase
c. Second Burn Phase
d. Post TLI Phase
e. Free Flight Phase
f. Post Separation Phase

The ascent phase, covering the portion of flight from guidance reference release to orbital insertion (694.98 seconds), is defined in Section 3. This trajectory was established from data provided by external electrical and optical tracking systems and telemetered onboard data obtained from the ST-124M guidance platform. External data were available from fixed cameras, theodolites, ODOP, and C-band radars.

The orbital phase, defined in Section 4, covers the portion of flight from orbital insertion to S-IVB restart sequence initiation (9,659.54 seconds). The orbital trajectory was established from data provided by external electrical tracking system and onboard data provided by the ST-124M guidance platform. External tracking data were provided by the C-band radars of the Manned Space Flight Network.

The second burn phase, also defined in Section 3, covers the portion of flight from S-IVB restart sequence initiation to translunar injection (10,565.51 seconds). This trajectory was established from data provided by an external electrical tracking system and telemetered onboard data obtained from the ST-124M guidance platform. External data were available from C-band radar.

The post translunar injection (TLI) phase, also defined in Section 4, covers the portion of flight from the translunar injection to S-IVB/CSM physical separation (12,059.3 seconds). This trajectory was established from data provided by the ST-124M guidance platform.

The free flight phase, defined in Section 5, covers the trajectories of the expended S-IC and S-II stages. These trajectories are based on initial conditions obtained from the postflight trajectory at separation. The separation impulses for both stages were used in the simulation.

The post separation phase, defined in Section 6, covers the trajectory of the S-IVB/IU after it was separated from the spacecraft

(Continued)

(CSM). This trajectory was produced by integrating forward from an initial point established from tracking.

Appendix A provides a detailed definition of the symbols, nomenclature, and coordinate systems used throughout the document.

Appendix B tabulates the time history of the trajectory parameters in metric units.

Appendix C tabulates the time history of the trajectory parameters in English units.

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SECTION 2

COORDINATE SYSTEMS AND LAUNCH PARAMETERS

The time history of Observed Mass Point Trajectory parameters in both metric and English units is tabulated in Appendices B and C, respectively. These tabulations are in earth-fixed launch site, geocentric inertial, and geographic polar coordinate systems. The earth-fixed launch site and geographic polar coordinate systems are defined in Reference 1, "Project Apollo Coordinate System Standards," (PACSS) and are designated PACSS10 and PACSS1, respectively. The geocentric inertial coordinate system, the trajectory symbols, and terminology used in this document are defined in Appendix A.

The Fischer Ellipsoid of 1960, see Reference 2, is used as the representative model for the earth and its gravitational field. All latitude and longitude coordinates are defined with respect to this ellipsoid.

The geographic coordinates for Launch Complex 39, Pad A, at the Kennedy Space Center are:

Geodetic Latitude	28.608422 degrees north
Geodetic Longitude	80.604133 degrees west

The heights of the gimbal plane and center of gravity of the launch vehicle above the reference ellipsoid are:

Gimbal Plane(Station 100)	32.0 m(105.0 ft)
C.G. at First Motion	59.5 m(195.2 ft)

The azimuth alignments are as follows:

Launch Azimuth	90.0 degrees east of north
Flight Azimuth	72.124 degrees east of north
ST-124M Platform Azimuth	72.124 degrees east of north

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SECTION 3

POWERED FLIGHT TRAJECTORY ANALYSIS

3.1 POWERED FLIGHT TRAJECTORY

3.1.1 Ascent Phase

A comparison of actual and nominal times for significant flight events is presented in Table 3-I. The nominal times for these events are taken from References 3 and 4.

The tracking stations and the vehicle ground track are shown in Figure 3-1.

The actual altitude, surface range, and cross range are shown in Figures 3-2 through 3-4, respectively, for the entire ascent trajectory. The magnitude of the total earth-fixed velocity vector and the associated elevation angle are shown in Figure 3-5. The magnitude of the total space-fixed velocity vector and the associated flight path angle are shown in Figure 3-6. The magnitude of the total inertial acceleration vector indicating the various engine cutoff profiles is shown in Figure 3-7. Mach number and dynamic pressure are shown during the S-IC phase of the ascent trajectory in Figure 3-8.

Various trajectory parameters, such as altitude, velocity, and acceleration are given at some significant event times in Table 3-II.

Engine cutoff and stage separation conditions are given in Tables 3-III and 3-IV, respectively.

The ascent trajectory, from guidance reference release to orbital insertion, is tabulated in Tables B-I through B-III in metric units, and in Tables C-I through C-III in English units. These tables present the trajectory in the earth-fixed launch site (PACSS10), geocentric inertial, and geographic polar (PACSS1) coordinate systems. The definitions pertaining to the trajectory symbols and the coordinate systems are given in Appendix A.

3.1.2 Second Burn Phase

A comparison of actual and nominal times for significant flight events pertaining to the second-burn phase is included in Table 3-I.

The actual altitude is shown in Figure 3-9. The magnitude of the total space-fixed velocity vector and the associated flight path angle are shown in Figure 3-10. The magnitude of the total inertial acceleration vector is shown in Figure 3-11.

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3.1.2 (Continued)

The maximum total inertial acceleration and earth-fixed velocity are shown in Table 3-II.

The translunar injection conditions are shown in Table 3-V.

The second burn trajectory, from the time of S-IVB restart sequence initiation to S-IVB/CSM physical separation, is tabulated in Tables B-V through B-VII in metric units, and in Tables C-V through C-VII in English units. These tables present the trajectory in the earth-fixed launch site (PACSS10), geocentric inertial, and geographic polar (PACSS1) coordinate systems. The definitions pertaining to the trajectory symbols and the coordinate systems are given in Appendix A.

3.1.3 Targeting Parameters

The actual and nominal targeting parameters are given in Table 3-VI. These parameters are used in the guidance computer as terminal conditions for the powered flight phases. This table is shown to illustrate that the actual mission was very close to nominal.

3.2 DATA SOURCES

3.2.1 Ascent Phase

Tracking data and telemetered guidance velocity data were obtained during the period from first motion through orbital insertion. The time periods for which tracking system coverage was available are shown in Figure 3-12 and itemized in Table 3-VII. The geographic locations of the tracking stations and the ground track for the ascent trajectory are shown in Figure 3-1. The antenna locations for the various tracking systems and the vehicle center of gravity are shown in Figure 3-13.

3.2.1.1 Optical Tracking Data

Optical tracking data were provided by both fixed cameras and theodolites. These data were available as position, velocity, and acceleration components in the earth-fixed launch site coordinate system and are defined as metric data. The fixed cameras furnished data from 1 second to 13 seconds. The theodolites furnished data from 10 seconds to 64 seconds.

Comparisons between optical tracking data and the ascent trajectory were calculated as position differences (tracking data minus trajectory data) in PACSS10. The maximum differences for camera data were found to be 5 m (16 ft) for the vertical components, 3 m (10 ft) for the cross range components, and 1 m (3 ft) for the down range components.

3.2.1.1 (Continued)

The maximum differences for theodolite data as compared with the ascent trajectory were found to be 6 m (20 ft), 8 m (26 ft), and 9 m (30 ft), respectively, for the vertical, cross-range, and down-range components.

3.2.1.2 ODOP

Data from the ODOP tracking system were available from 0 to 106 seconds. These data were received in reduced metric form as position, velocity, and acceleration components. Comparisons between ODOP data and the ascent trajectory were calculated as position differences in PACSS10. The differences in vertical (XE), cross-range (YE), and down-range (ZE) components versus time are shown in Figure 3-14. The maximum differences were less than 10 m (33 ft) in all three components.

3.2.1.3 C-Band Radars

Extensive C-band tracking data were furnished by the stations located at Cape Kennedy, Patrick Air Force Base, Merritt Island, Grand Bahama Island, Grand Turk Island, and Bermuda Island. These tracking data were provided as measured parameters in azimuth angle, elevation angle, and slant range. These measurements are defined in Reference 1 and designated as PACSS3a.

Comparisons between these data and the ascent trajectory were calculated in PACSS3a. The position components of the ascent trajectory in PACSS10 were corrected for the differences between the center of gravity and each transponder location. The corrected position components were transformed into the measured parameters of PACSS3a. Differences or deviations (tracking data minus corresponding parameters derived from ascent trajectory) were calculated and plotted as functions of time. These difference plots were smoothed and plotted as Figures 3-15 through 3-17.

Cape Kennedy (1.16) radar data from 0 to 299 seconds were received. The azimuth and elevation angle measurements were noisy throughout the time span of tracking. A discontinuity in the slant range occurred at approximately 252 seconds indicating a switch from beacon to skin tracking. The azimuth and elevation angle measurements deviated considerably from the ascent trajectory up to about 150 seconds. After 150 seconds, the data agree favorably with the trajectory with maximum deviations of 0.04 degree in azimuth angle, 0.06 degree in elevation angle, and 90 m (295 ft) in slant range.

Patrick (0.18) radar data from 23 to 550 seconds, with a data gap from 58 to 85 seconds, were received.

3.2.1.3 (Continued)

The azimuth and elevation angle measurements were noisy and deviated considerably from the trajectory during the early portion (24 to 130 seconds) and the later portion (420 to 550 seconds) of tracking. Between 130 and 420 seconds, all three measurements agree favorably with the ascent trajectory with maximum deviations of 0.02 degree in azimuth angle, 0.07 degree in elevation angle, and 80 m (262 ft) in slant range.

Merritt Island (19.18) radar data from 0 to 523 seconds, with a data gap from 71 to 152 seconds, were received. The azimuth angle and slant range measurements were of good quality throughout the time span of tracking. The elevation angle measurements were noisy and deviated considerably from the ascent trajectory at the beginning (0 to 71 seconds) and during the later portion (470 to 523 seconds) of tracking. A discontinuity in slant range measurements occurred at approximately 325 seconds, indicating a switch from beacon to skin tracking. Between 153 and 440 seconds, all three measurements agree favorably with the ascent trajectory with maximum deviations of 0.01 degree in azimuth angle, 0.04 degree in elevation angle, and 80 m (262 ft) in slant range.

Grand Bahama (3.18) radar data from 92 to 523 seconds were received. The data were of good quality except that the elevation angle measurements were erratic near the end (490 to 523 seconds) of the tracking period. Between 95 and 470 seconds, all three measurements agree favorably with the ascent trajectory with maximum average deviations of 0.02 degree in azimuth angle, 0.02 degree in elevation angle, and 80 m (262 ft) in slant range.

Grand Turk (7.18) radar data from 206 to 607 seconds were received. The azimuth angle measurements were of good quality except near the end (525 to 607 seconds) of tracking period where the data were erratic. The elevation angle measurements were noisy throughout the tracking period, and became erratic at the beginning (206 to 255 seconds) and during the later portion (505 to 607 seconds) of tracking. The slant range measurements contained little noise throughout the tracking period. Between 255 and 505 seconds, all three measurements agree favorably with the ascent trajectory with maximum deviations of 0.01 degree in azimuth angle, 0.04 degree in elevation angle, and 140 m (459 ft) in slant range.

Bermuda (67.16) radar data from 309 to 777 seconds were received. The azimuth and elevation angle measurements were noisy throughout the tracking period, and had a large deviation from the ascent trajectory in the time interval between 510 and 575 seconds. The slant range measurements contained little noise throughout the tracking period. In the time

3.2.1.3 (Continued)

intervals of 330 to 510 seconds, and 575 to 695 seconds, all three measurements agree favorably with the ascent trajectory with maximum deviations of 0.04 degree in azimuth angle, 0.03 degree in elevation angle, and 210 m (689 ft) in slant range.

Bermuda (67.18) radar data from 254 to 767 seconds were received. The azimuth and elevation angle measurements were noisy throughout the tracking period, and had a large deviation from the ascent trajectory in the time interval between 510 and 575 seconds. The slant range measurements contained little noise throughout the tracking period. In the time intervals of 280 to 510 seconds, and 575 to 695 seconds, all three measurements agree favorably with the ascent trajectory with maximum deviations of 0.04 degree in both azimuth and elevation angles, and 170 m (558 ft) in slant range.

3.2.2 Second Burn Phase

Tracking data and telemetered guidance velocity data were obtained during the period of S-IVB second burn. The time period for which tracking system coverage was available is shown in Figure 3-18, and Table 3-VII.

C-band tracking data were furnished by the station located at Hawaii. The tracking data were provided as measured parameters in azimuth angle, elevation angle, and slant range. These measurements are defined in Reference 1 and designated as PACSS3a.

Comparison between the tracking data and the second burn trajectory was calculated in PACSS3a. The position components of the second burn trajectory in PACSS10 were transformed into the measured parameters of PACSS3a. Differences or deviations (tracking data minus corresponding parameters derived from second burn trajectory) were calculated and plotted as functions of time. These difference plots were smoothed and plotted as Figure 3-19.

Hawaii radar data were received in both the high-frequency (10 samples per second) and low-frequency (one sample per 6 seconds) forms. The high-frequency data were received from 10,240 to 10,674 seconds, with two data gaps from 10,409 to 10,424 seconds and from 10,461 to 10,558 seconds. The low-frequency data were received from 10,266 to 10,644 seconds. The azimuth and elevation angle measurements for both sets of data were noisy throughout their respective tracking period. The slant range measurements contained little noise. Between 10,280 and 10,565 seconds, both sets of data agree favorably with the second burn trajectory with maximum deviations of 0.02 degree in azimuth angle, 0.02 degree in elevation angle, and 190 m (623 ft) in slant range.

3.3 TRAJECTORY DETERMINATION

3.3.1 Ascent Phase

The ascent trajectory from guidance reference release to orbital insertion was established by a composite solution of available tracking data and telemetered onboard guidance velocity data.

Before the data were used in the trajectory solution, one or more of the following processing steps was performed:

a. Inspecting for format and parity errors
b. Time editing
c. Data editing and filtering
d. Refraction correction
e. Reformatting
f. Coordinate transformation

The position components of the tracking point of the vehicle in PACSS10 were established by merging the launch phase and ascent phase trajectory segments.

The launch phase (from first motion to 22 seconds) was established by integrating the telemetered body-fixed accelerometer data, and verified by optical and ODOP tracking data. The ascent phase (from 22 seconds to orbital insertion at 694.98 seconds) was based on a composite fit of external tracking data and telemetered onboard guidance velocity data. A computer program (GATE), which uses a guidance error model, was utilized. The telemetered guidance velocity data were used as the generating parameter and error coefficients were estimated to best fit the tracking observations. The Kalman recursive method was used for the estimation. The GATE program was also constrained to satisfy the insertion conditions that were obtained by the Orbital Correction Program (OCP). Reference 5 gives a theoretical discussion of the GATE program.

The GATE output data were then transformed to the vehicle center of gravity.

The position components, in PACSS10, were filtered and differentiated to obtain vehicle velocity and acceleration components. Since numerical differentiators tend to distort the data through the transient areas (engine cutoffs), the guidance velocity data were integrated and used to fill in these areas.

The trajectory data in PACSS10 were then transformed to several coordinate systems. Various trajectory parameters were also calculated and are presented in Appendices B and C.

3.3.1 (Continued)

In calculating the Mach number and dynamic pressure, measured meteorological data were used up to an altitude of 89.75 km (48.46 n mi). Above this altitude, the measured data were merged into the U. S. Standard Reference Atmosphere.

3.3.2 Second Burn Phase

The second burn trajectory from the S-IVB restart through translunar injection was established by a composite solution of available tracking data and telemetered onboard guidance velocity data.

Before the data were used in the trajectory solution, the data were processed in a similar manner as described in Paragraph 3.3.1.

The second burn trajectory was determined by the same computer program (GATE) in the same manner as described in Paragraph 3.3.1, except that a state vector prior to S-IVB restart was used to initialize the program. This state vector was obtained from the orbital trajectory as described in Section 4.

The position components were filtered, differentiated, shaped, and transformed in the same manner as described in Paragraph 3.3.1.

3.4 ERROR ANALYSIS

3.4.1 Ascent Phase

An estimate of the total uncertainty of the ascent trajectory can be obtained by examining the tracking data comparison plots and utilizing the accuracy of the insertion point obtained by orbital analysis.

Comparisons of the metric data with the ascent trajectory are shown in Figure 3-14. Comparisons of the measured parameter data with the ascent trajectory are shown in Figures 3-15 through 3-17. These plots illustrate the dispersion and scattering of the data.

The accuracy of the insertion point, established in Section 4.3.1 by the Orbital Correction Program (OCP), was ±500 m (±1640 ft) in position components and ±1.0 m/s (±3.3 ft/s) in velocity components referenced to the earth-fixed launch site coordinate system (PACSS10).

Based on the above information, an estimate of the total uncertainty of the ascent trajectory was derived and plotted in

3.4.1 (Continued)

Figure 3-20. At S-IC OECO, the estimated uncertainties of position and velocity components in PACSS10 are ±80 m (±262 ft) and ±0.4 m/s (±1.3 ft/s), respectively. At S-II ECO, the estimated uncertainties of position and velocity components in PACSS10 are ±360 m (±1181 ft) and ±0.7 m/s (±2.6 ft/s), respectively. At S-IVB 1st ECO and orbital insertion, the estimated uncertainties of position and velocity components in PACSS10 have increased to ±500 m (±1640 ft) and ±1.0 m/s (±3.3 ft/s), respectively.

3.4.2 Second Burn Phase

Comparisons of the C-band radar measured parameters with the second burn trajectory are shown in Figure 3-19. The azimuth and elevation angle measurements agree with the second burn trajectory to within 0.02 degree. The slant range measurements agree with the second burn trajectory to within 190 m (623 ft).

The estimate of the total uncertainty of the second burn trajectory is difficult to establish with any degree of confidence due to coverage by a single C-band tracker during this portion of flight. However, it is felt that a reasonable estimate of uncertainties in position and velocity components (PACSS10) would be ±1 km (±0.5 n mi) and ±3 m/s (±10 ft/s) respectively.

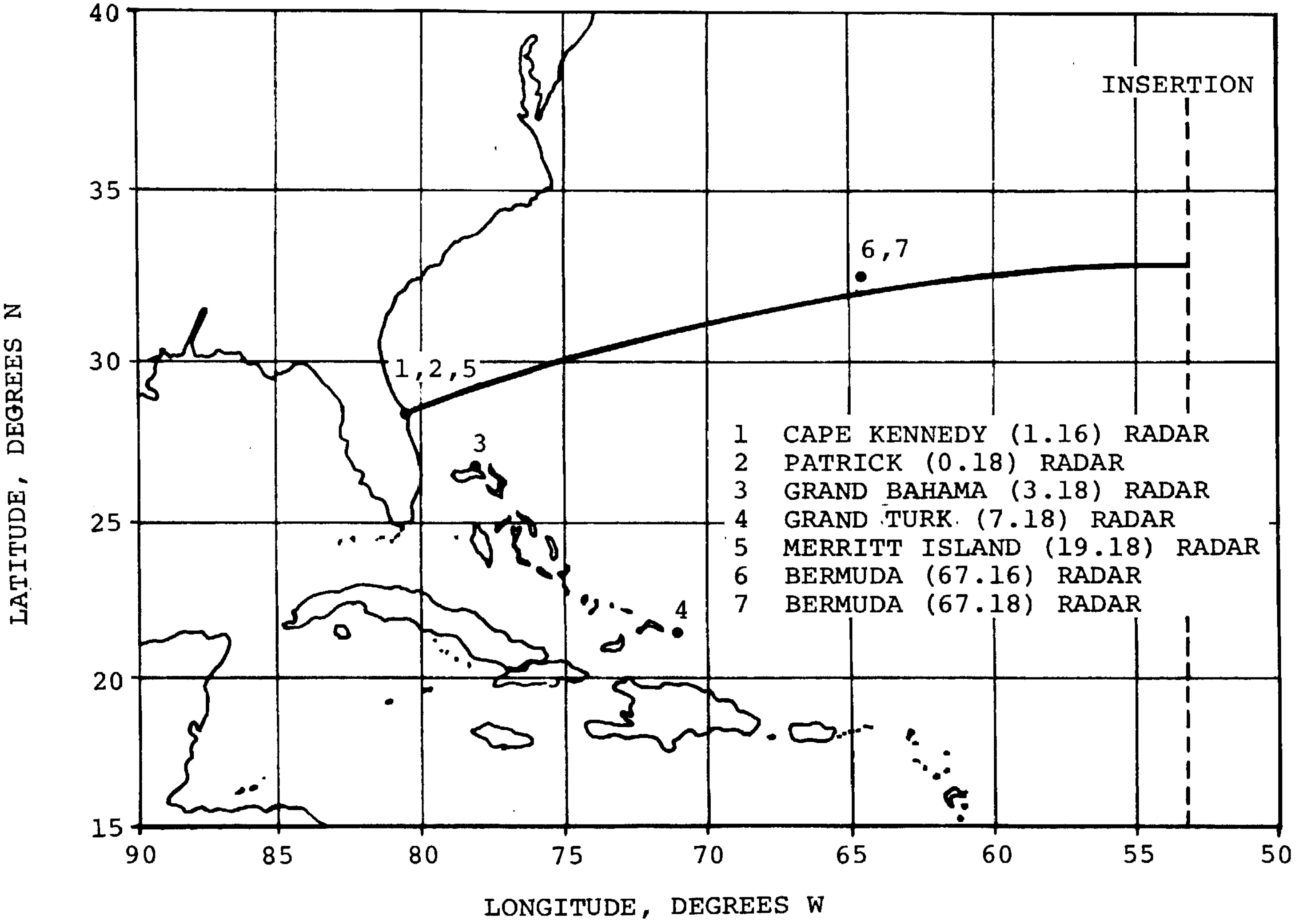

FIGURE 3-1. GROUND TRACK AND TRACKING STATIONS - ASCENT PHASE

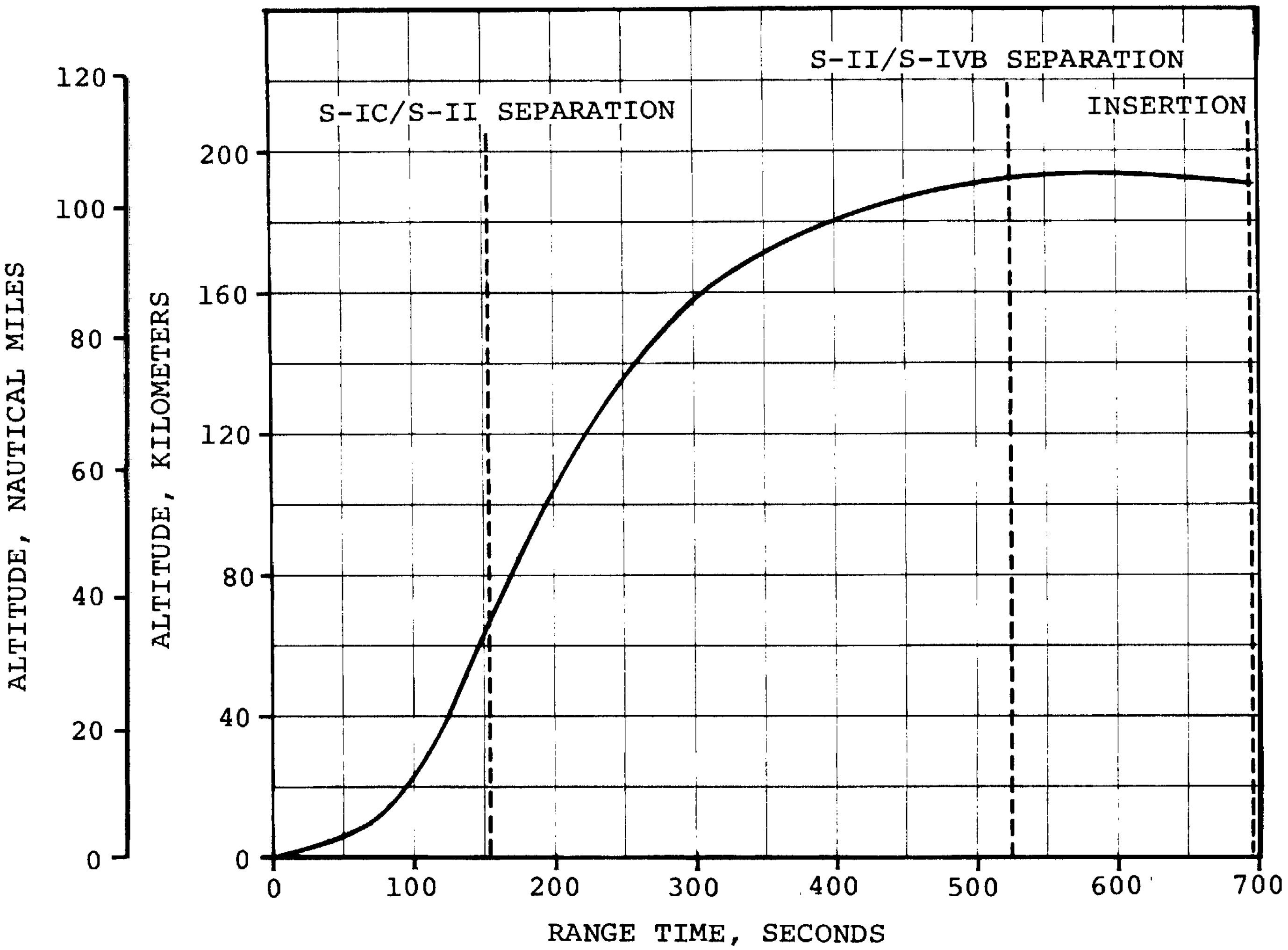

FIGURE 3-2. ALTITUDE - ASCENT PHASE

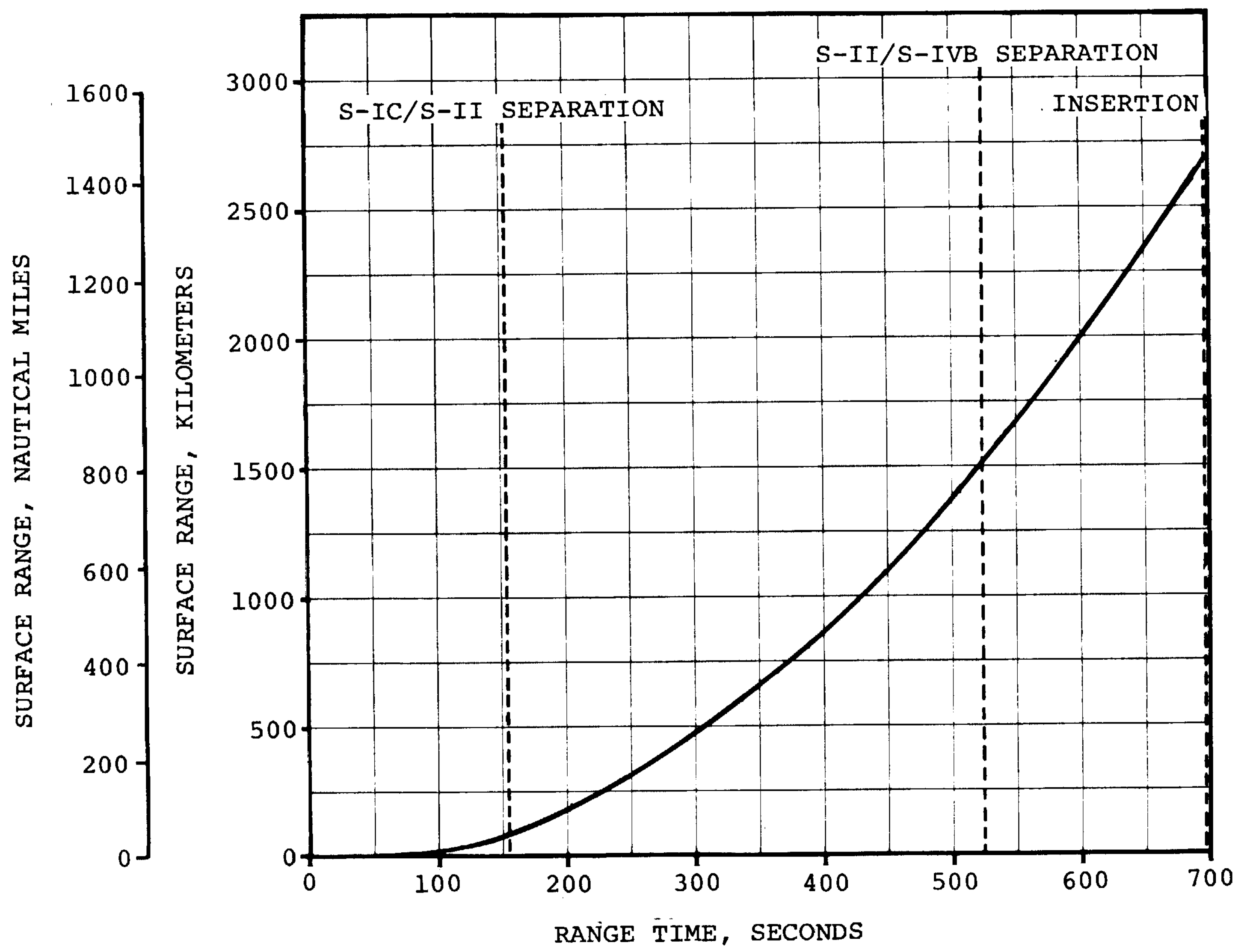

FIGURE 3-3. SURFACE RANGE - ASCENT PHASE

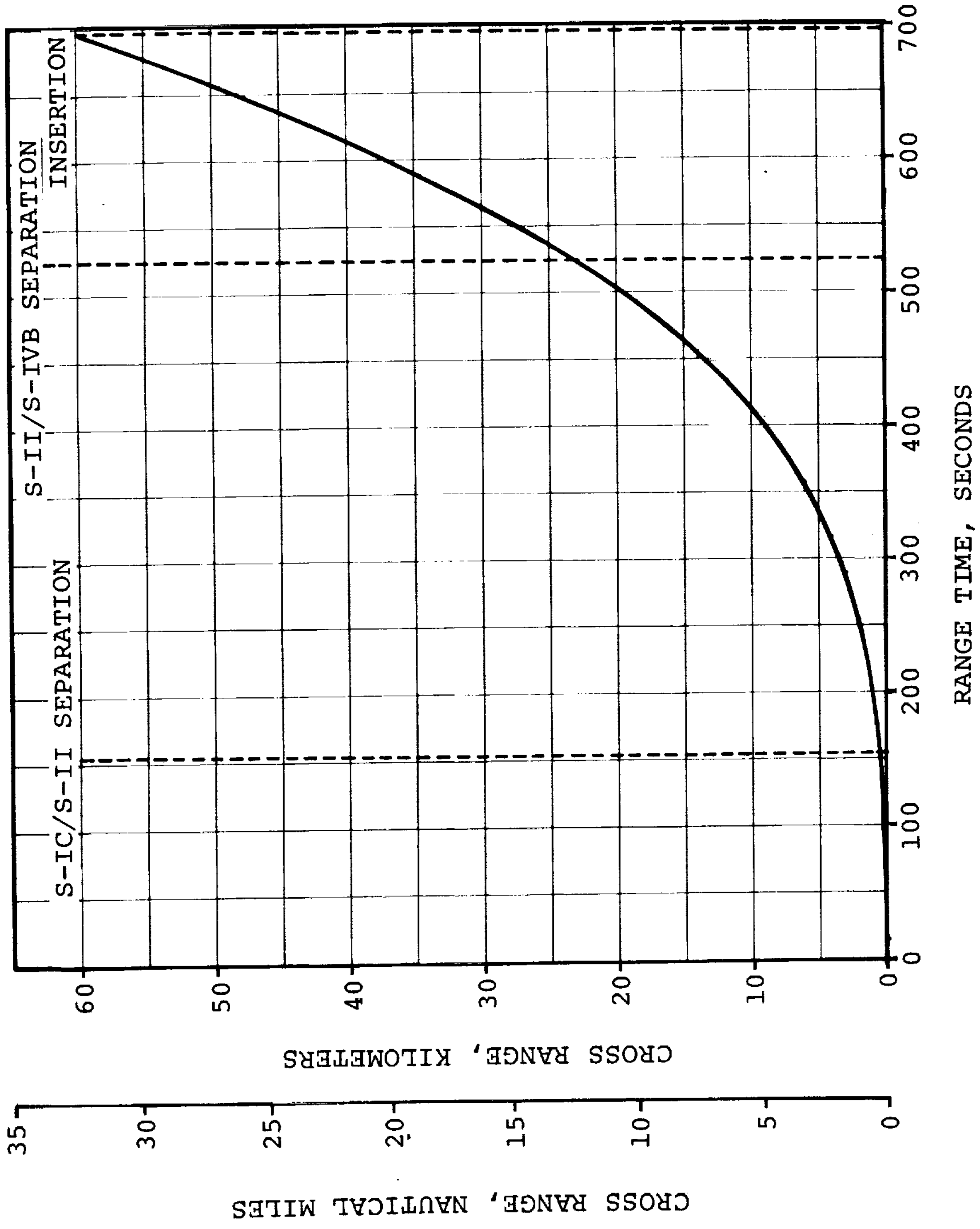

FIGURE 3-4. CROSS RANGE - ASCENT PHASE

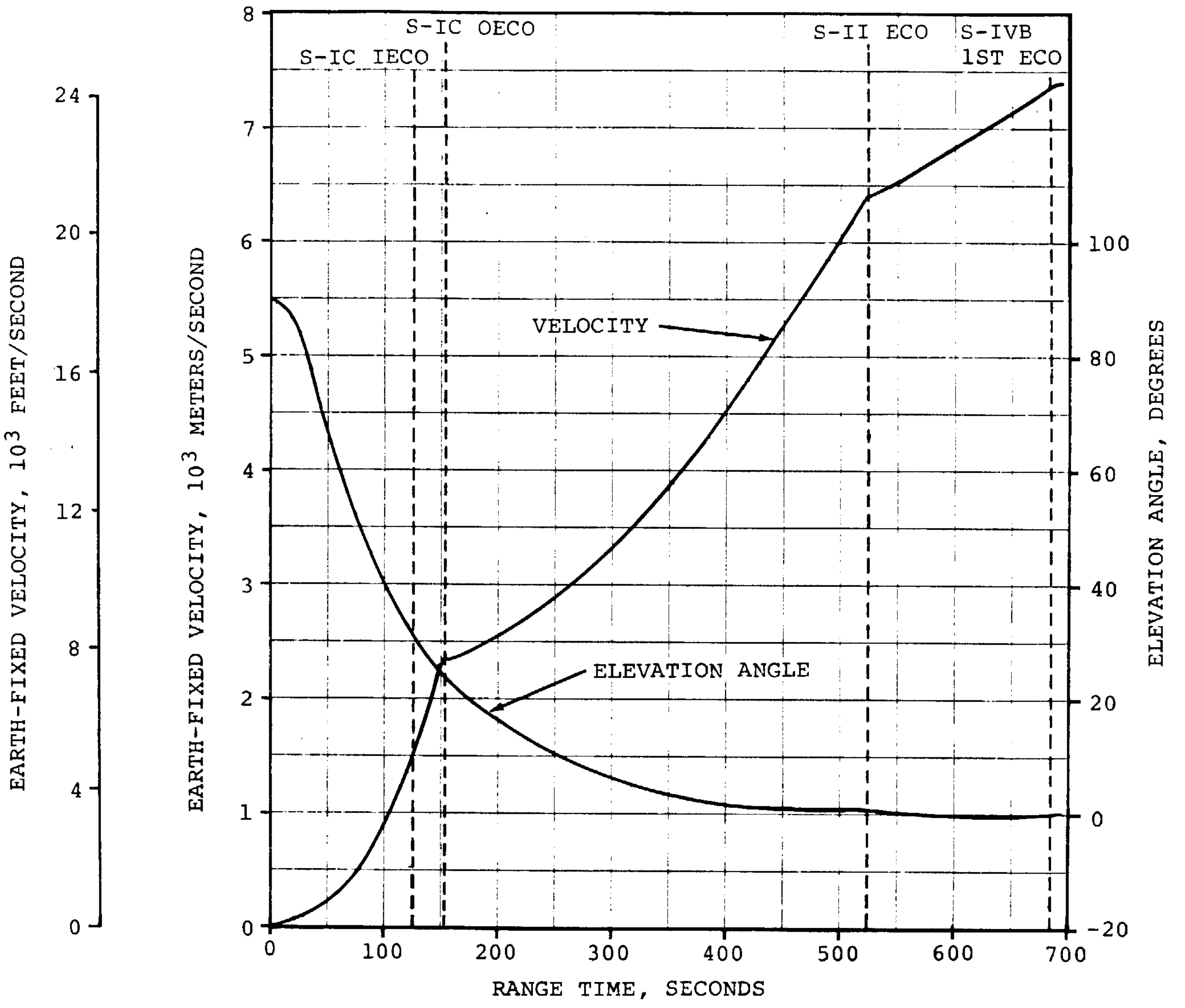

FIGURE 3-5. EARTH-FIXED VELOCITY AND ELEVATION ANGLE - ASCENT PHASE

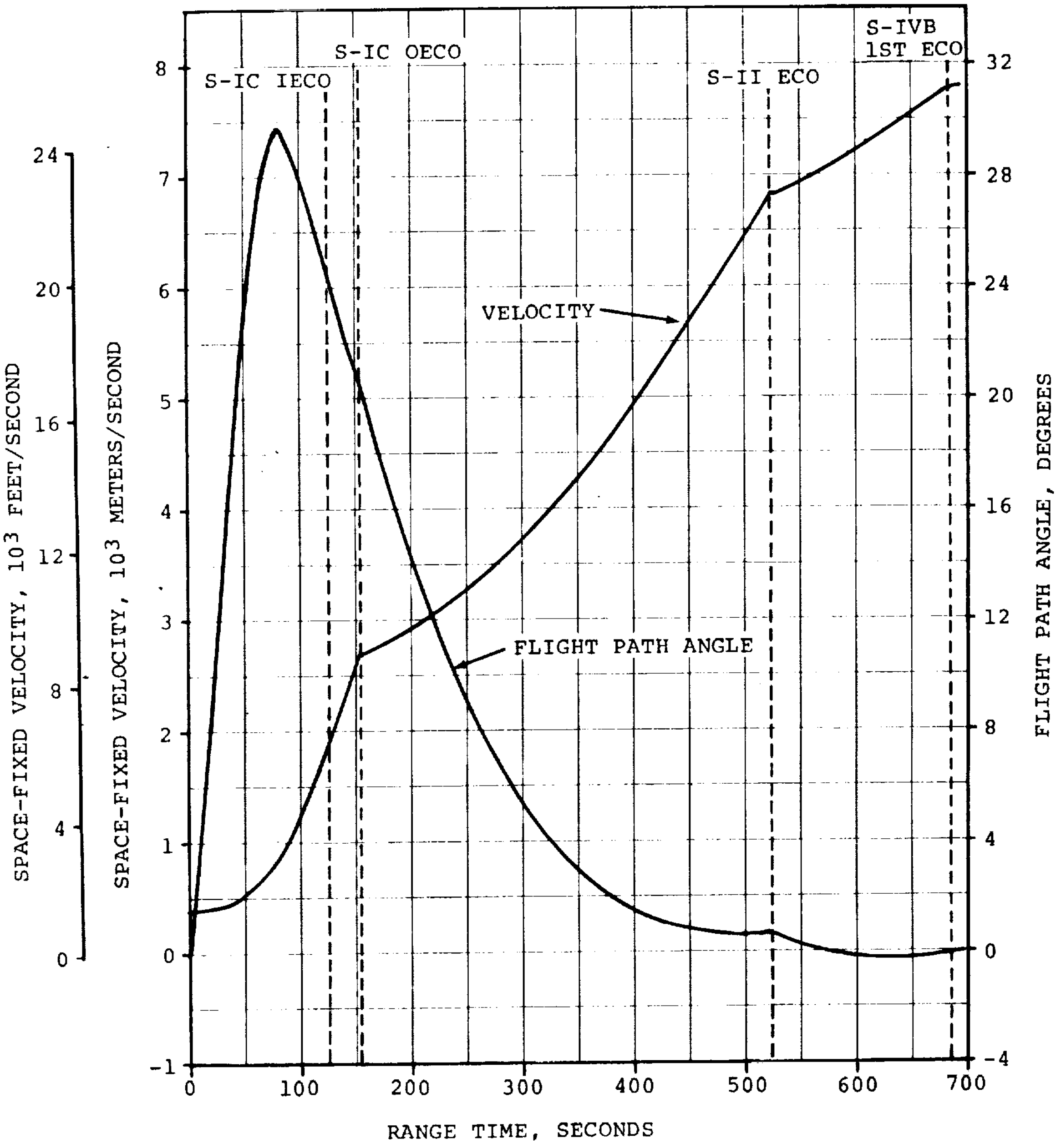

FIGURE 3-6. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - ASCENT PHASE

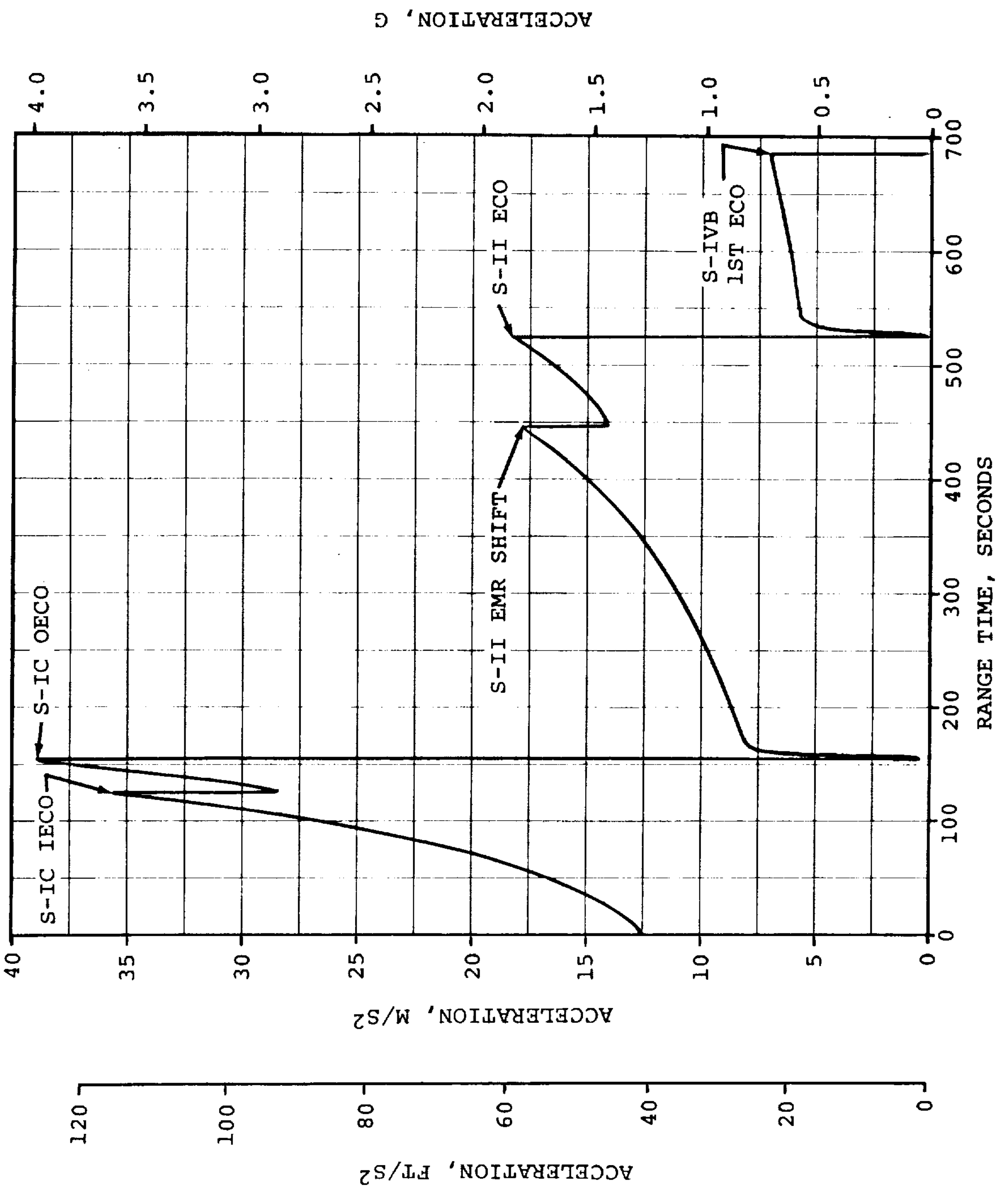

FIGURE 3-7. TOTAL INERTIAL ACCELERATION - ASCENT PHASE

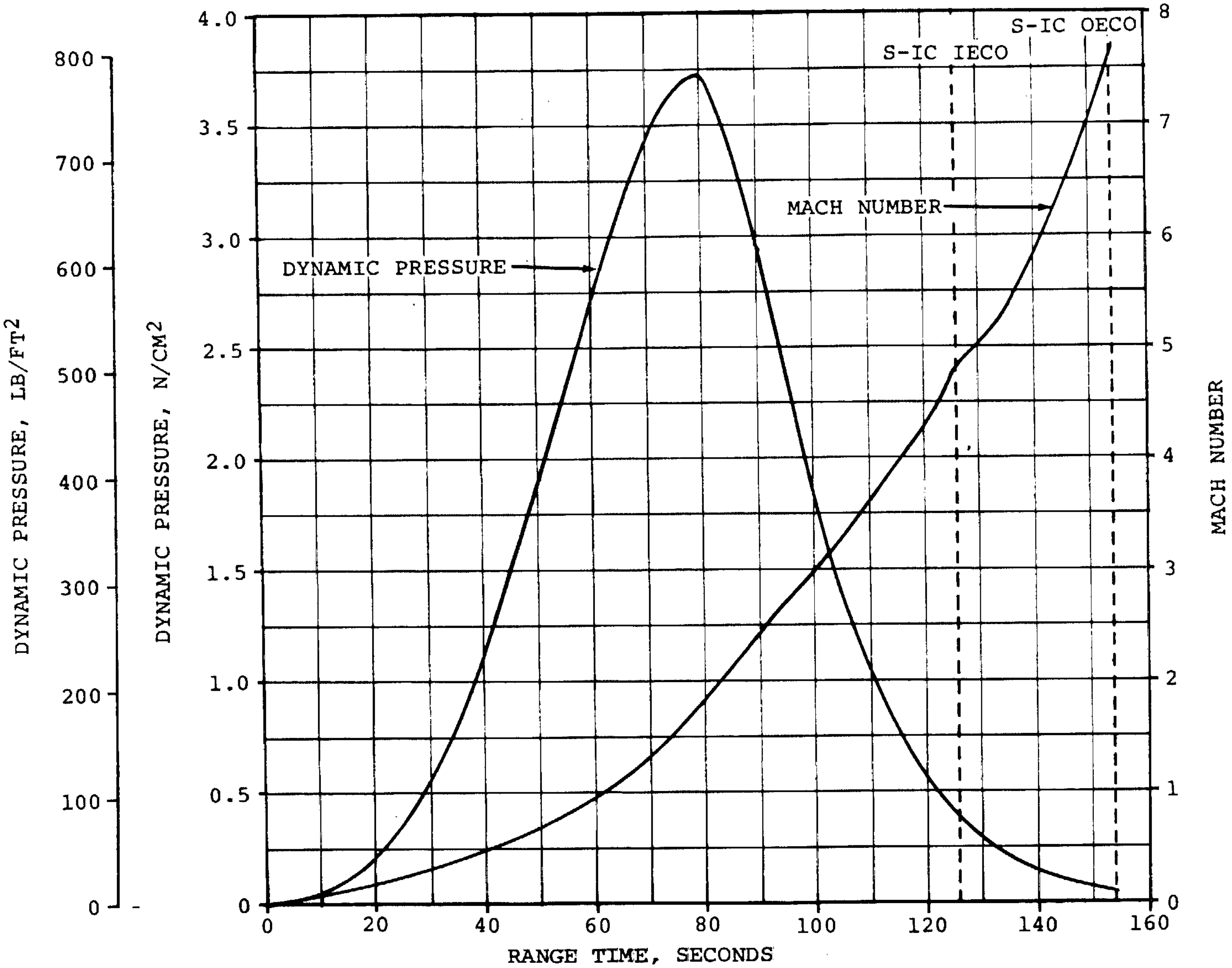

FIGURE 3-8. MACH NUMBER AND DYNAMIC PRESSURE - S-IC PHASE

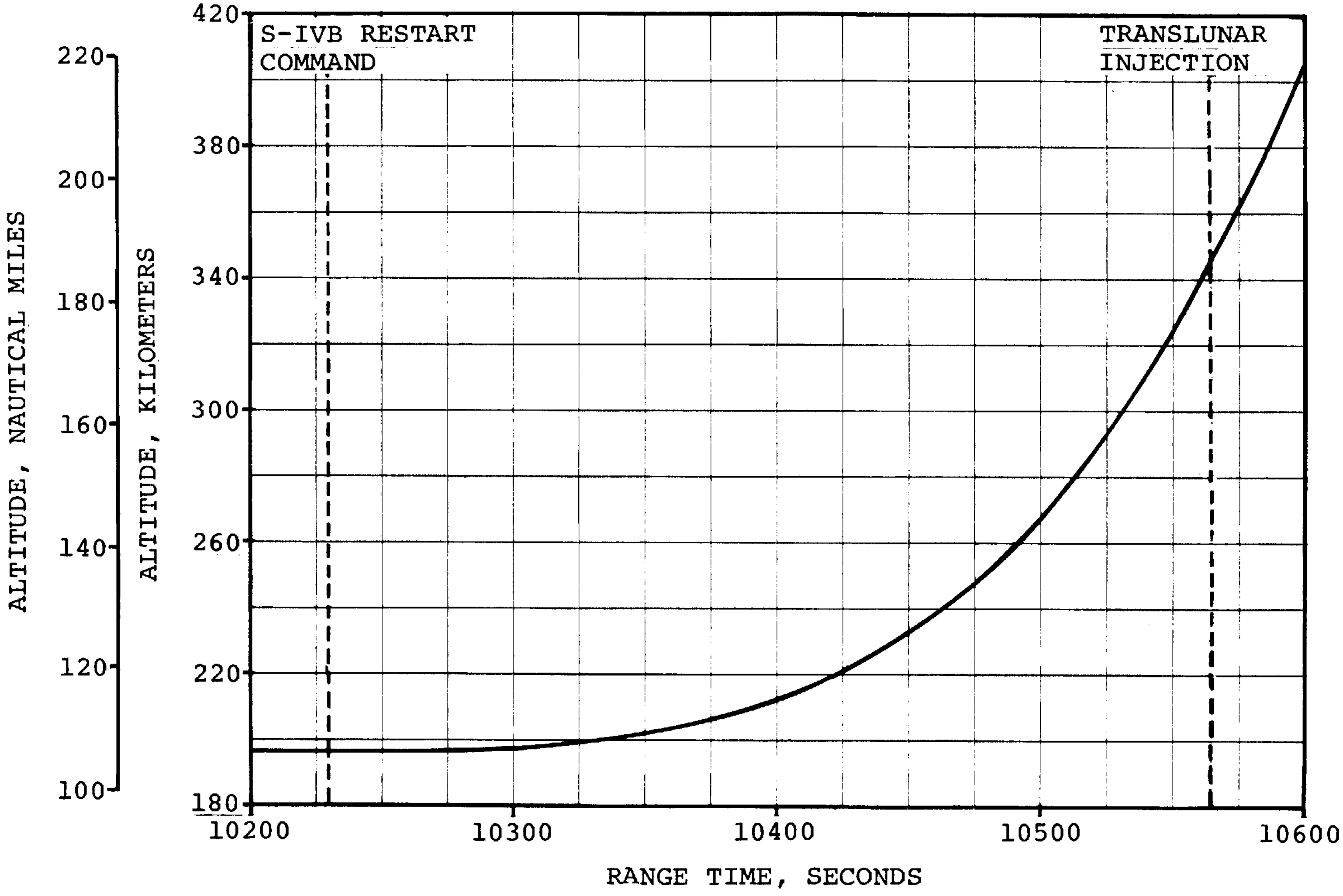

FIGURE 3-9. ALTITUDE - SECOND BURN PHASE

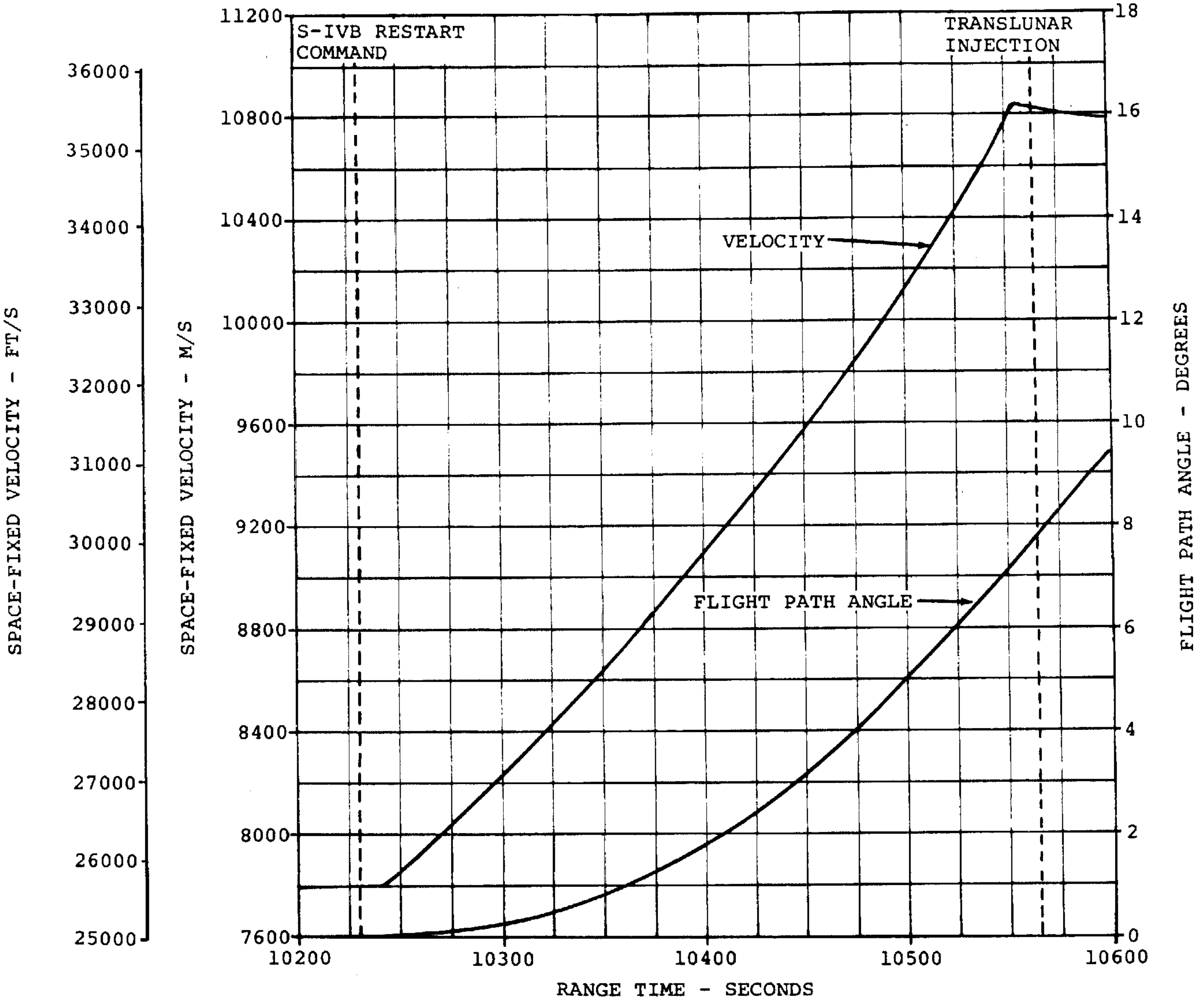

FIGURE 3-10. SPACE-FIXED VELOCITY AND FLIGHT PATH ANGLE - SECOND BURN PHASE

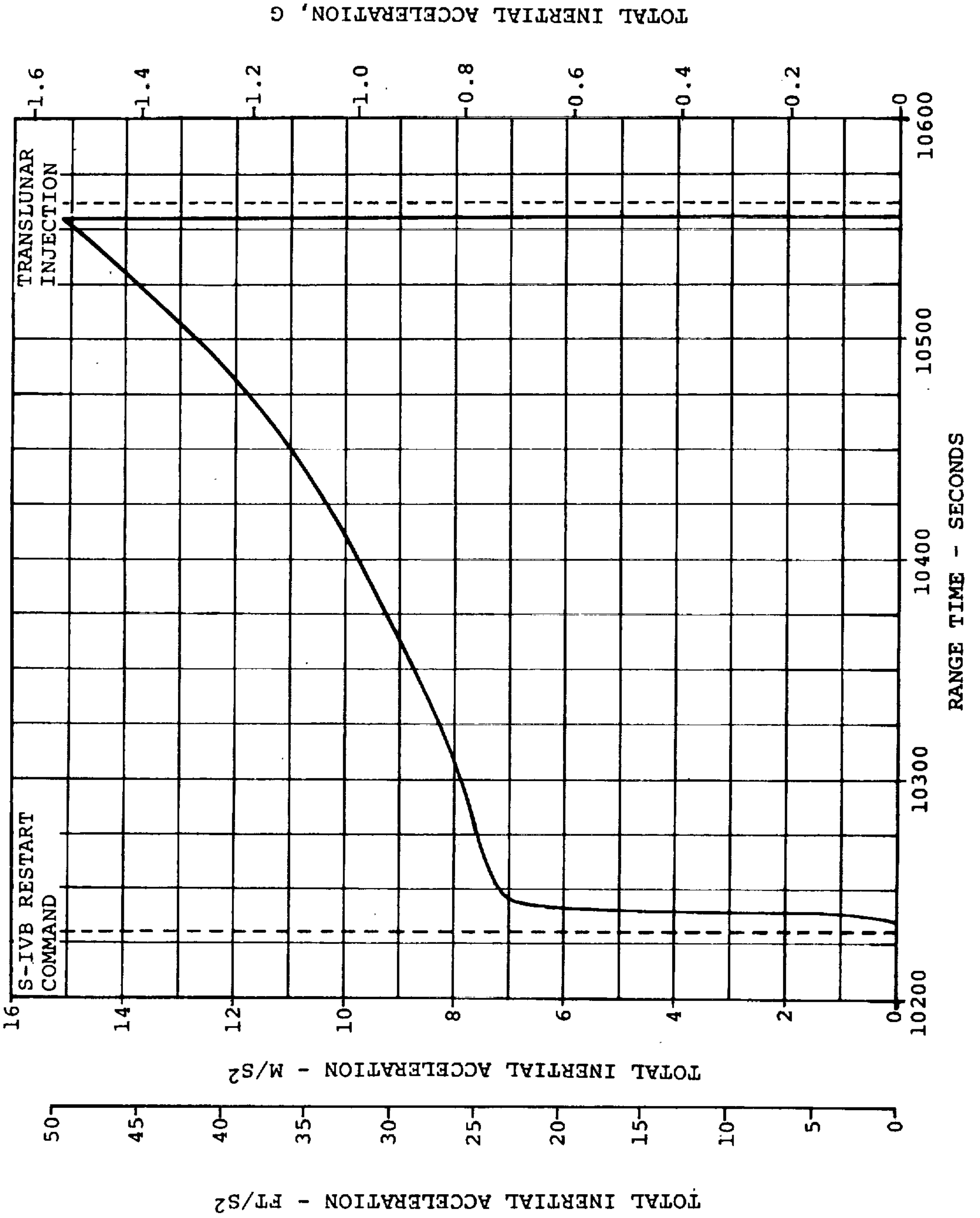

FIGURE 3-11. TOTAL INERTIAL ACCELERATION - SECOND BURN PHASE

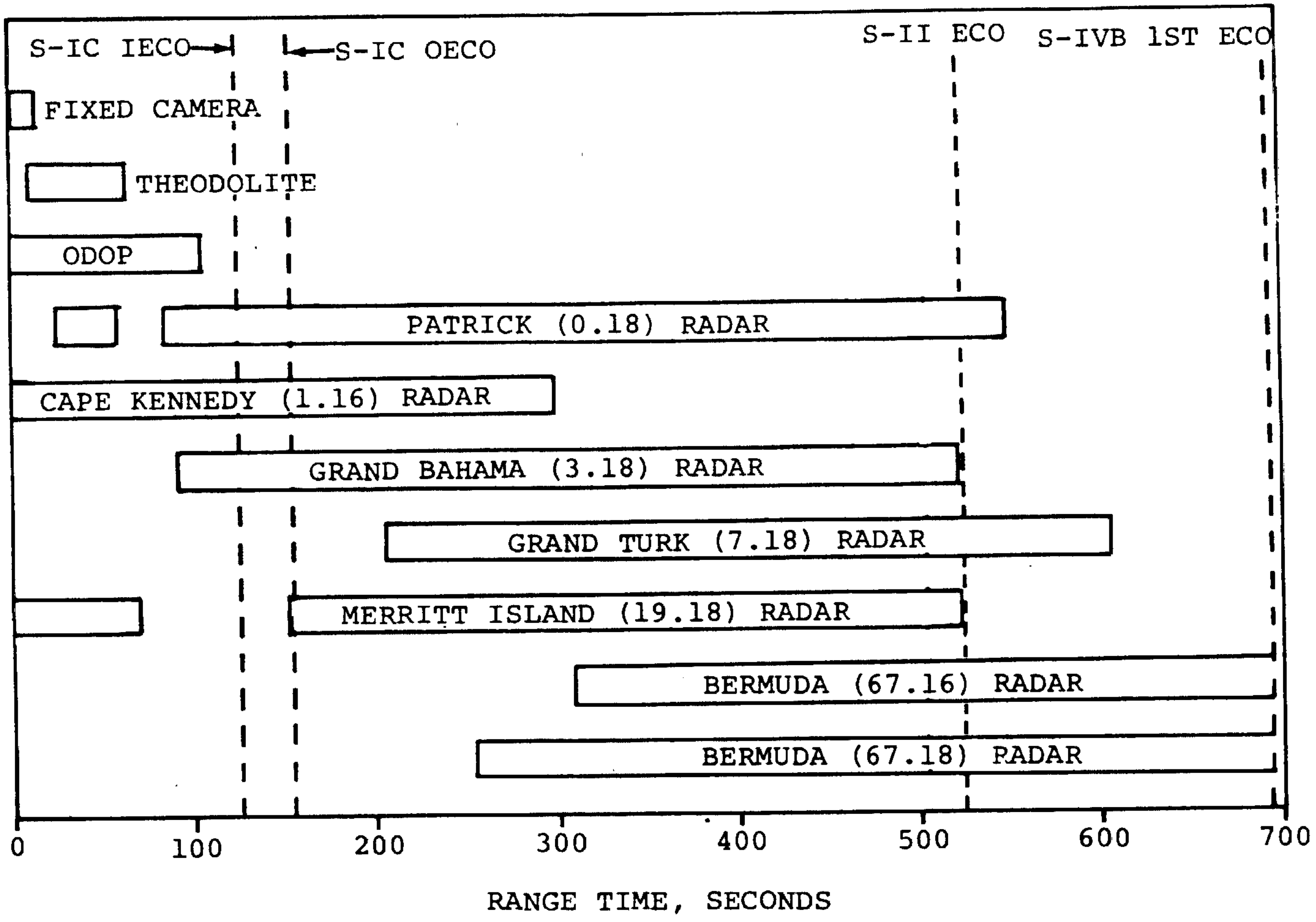

FIGURE 3-12. AVAILABLE TRACKING DATA - ASCENT PHASE

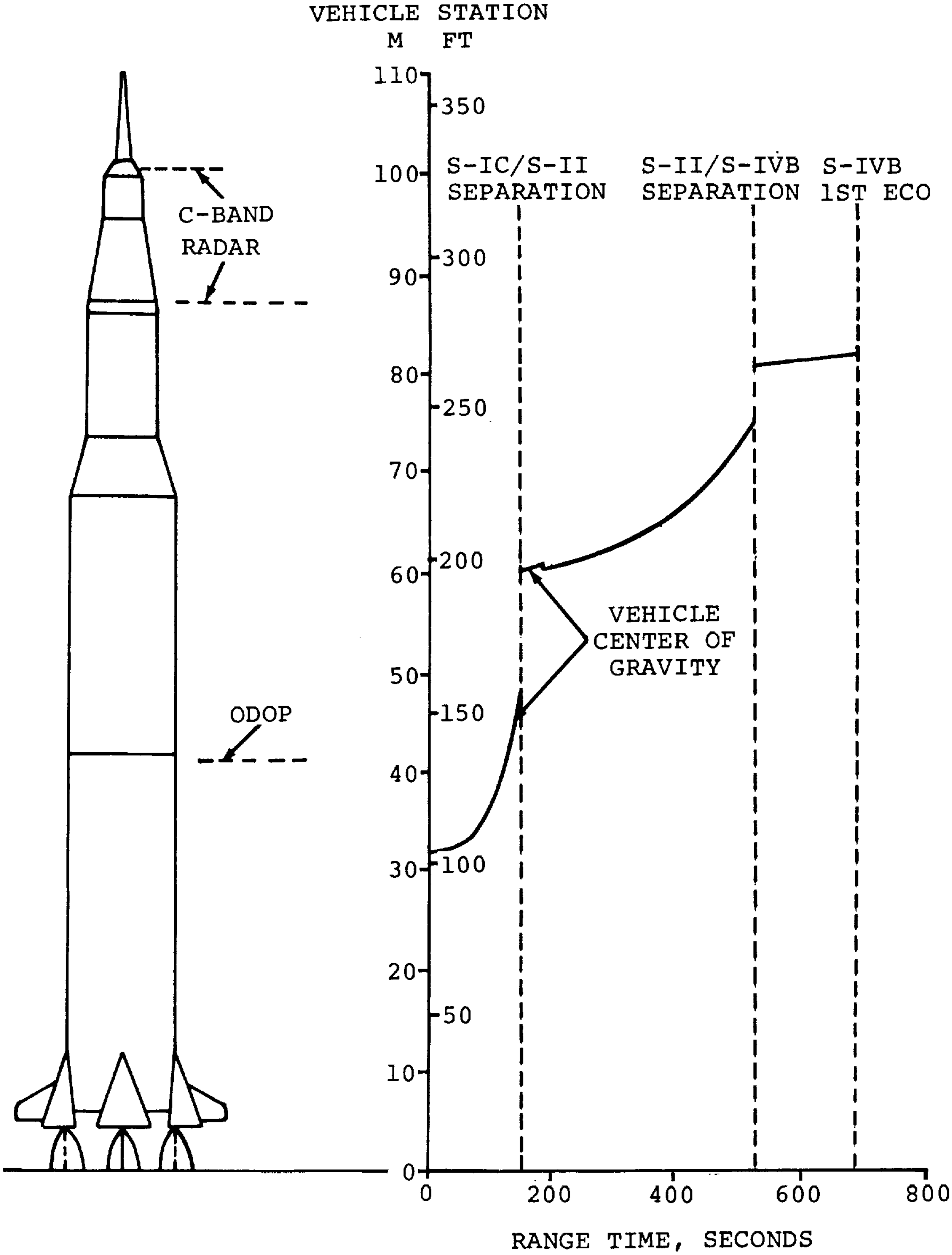

FIGURE 3-13. ANTENNA LOCATIONS AND CENTER OF GRAVITY

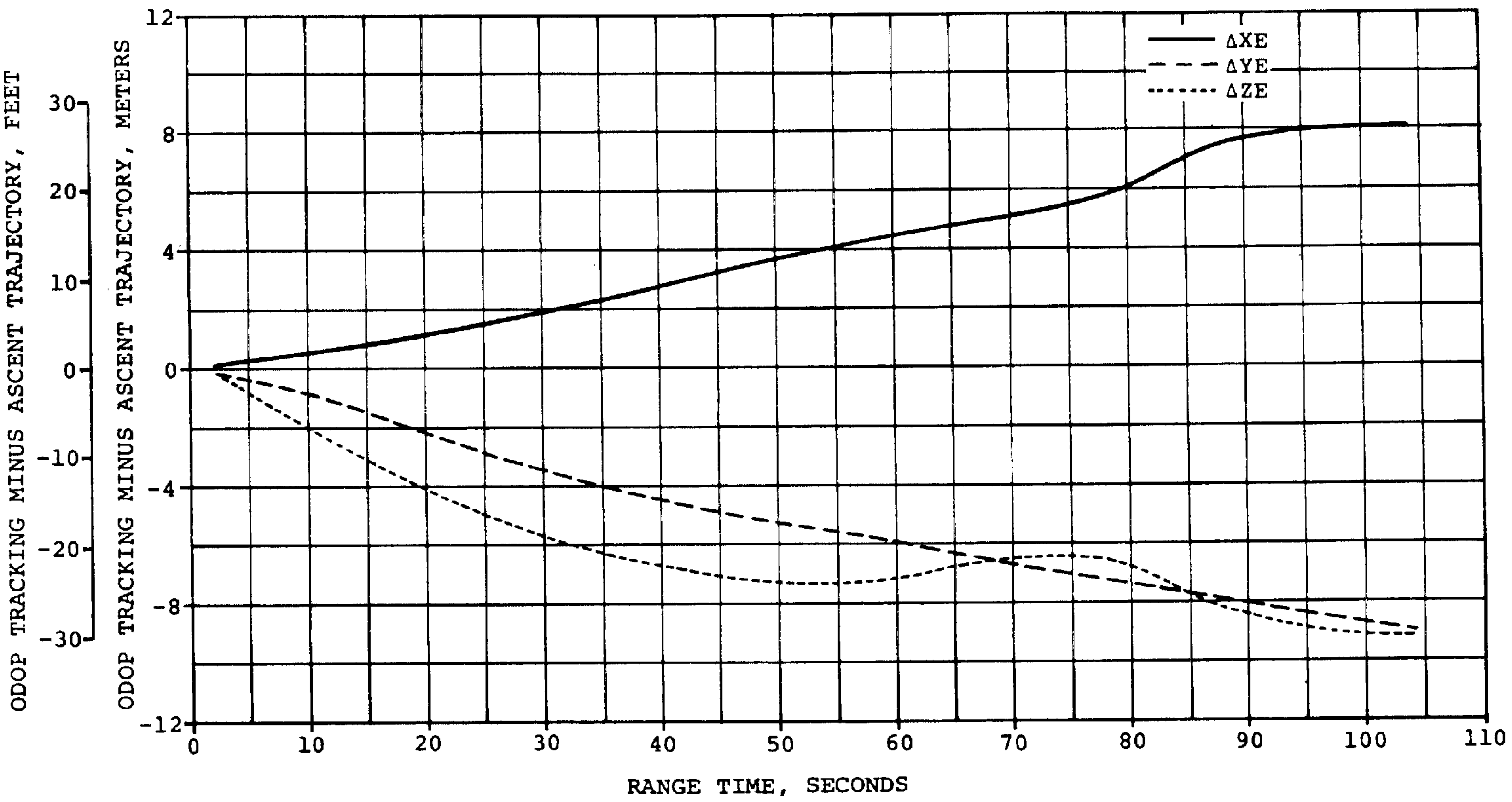

FIGURE 3-14. METRIC TRACKING COMPARISONS - ASCENT PHASE

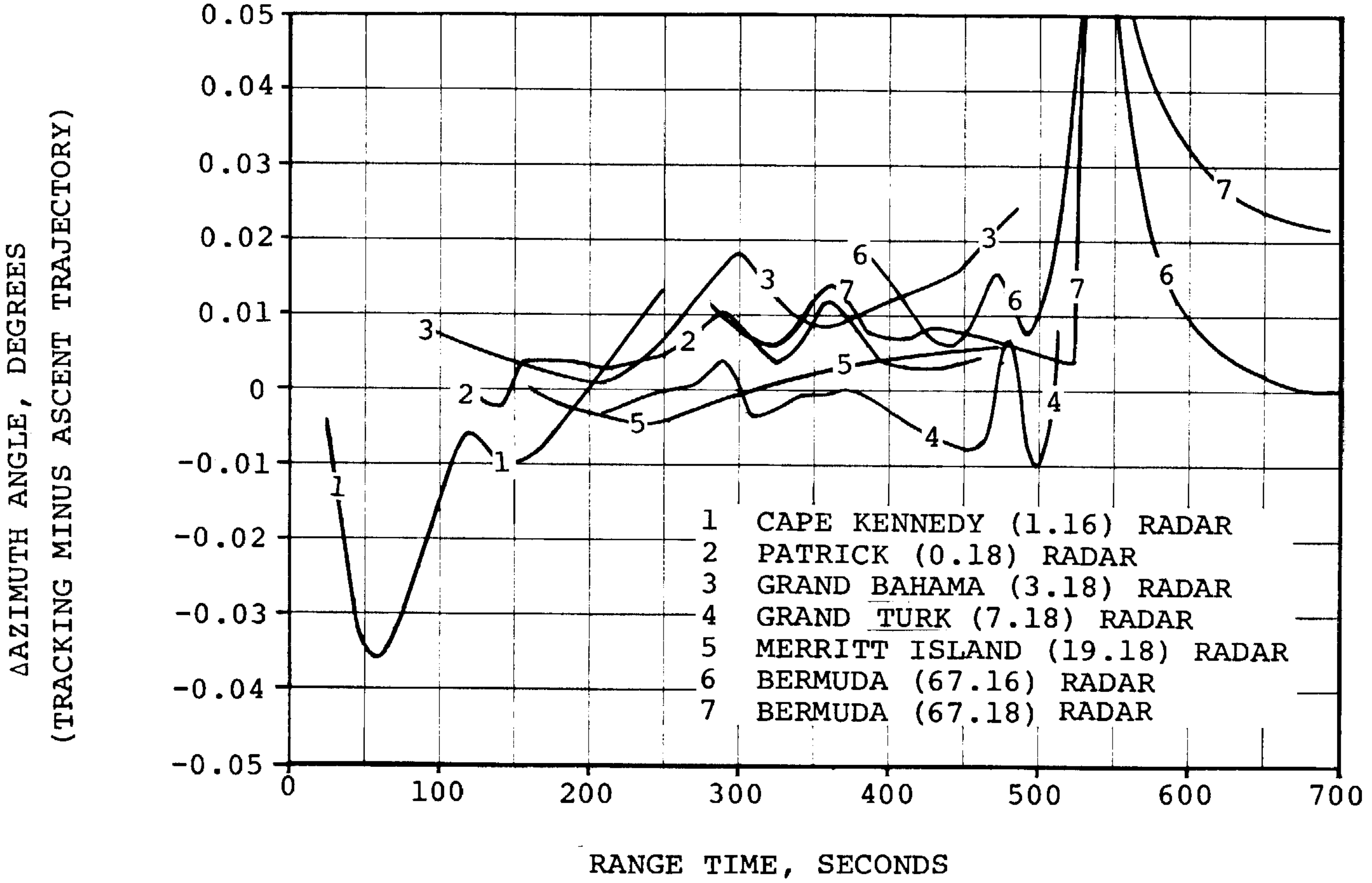

FIGURE 3-15. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT PHASE

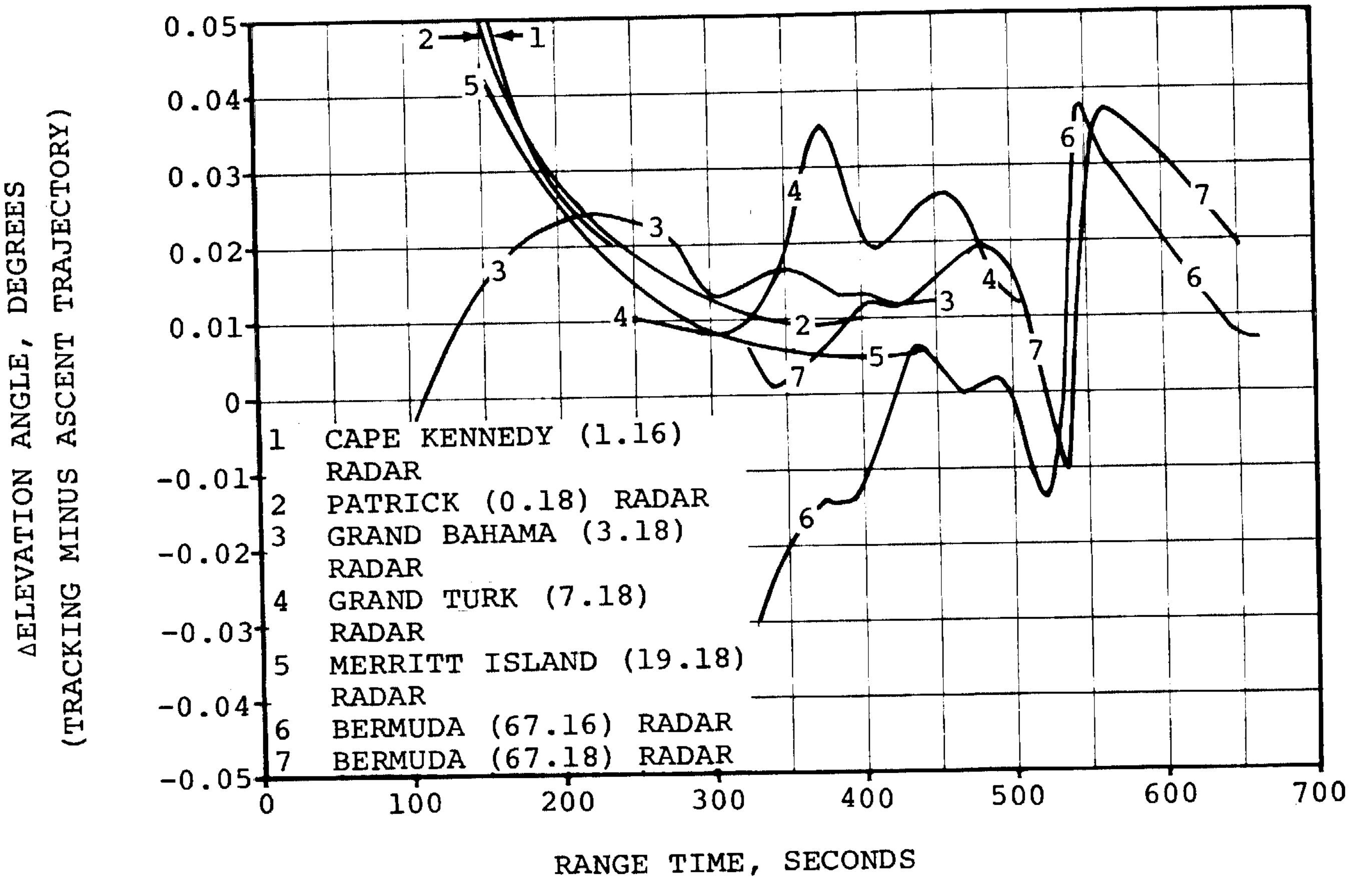

FIGURE 3-16. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT PHASE

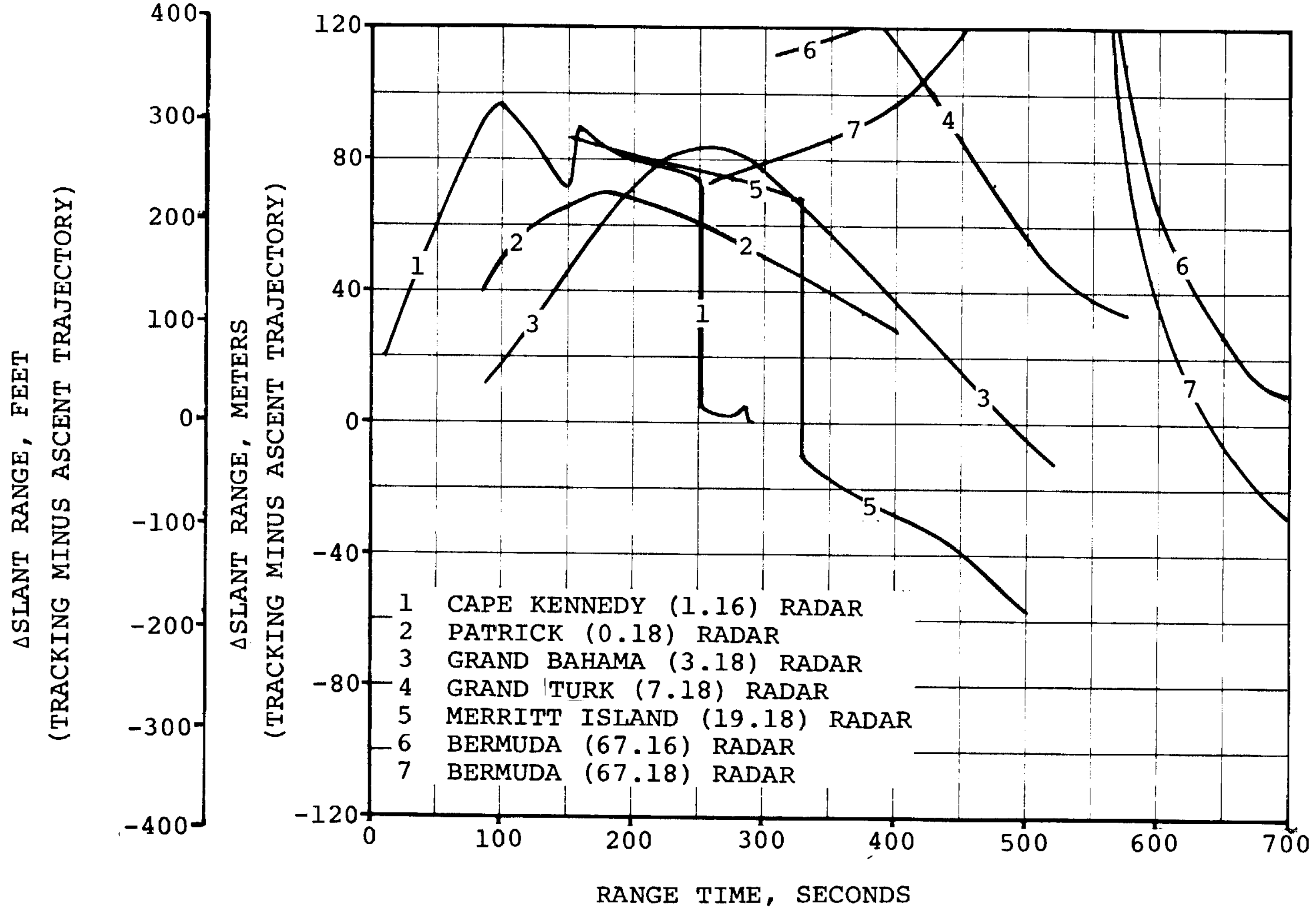

FIGURE 3-17. MEASURED PARAMETER TRACKING COMPARISONS - ASCENT PHASE

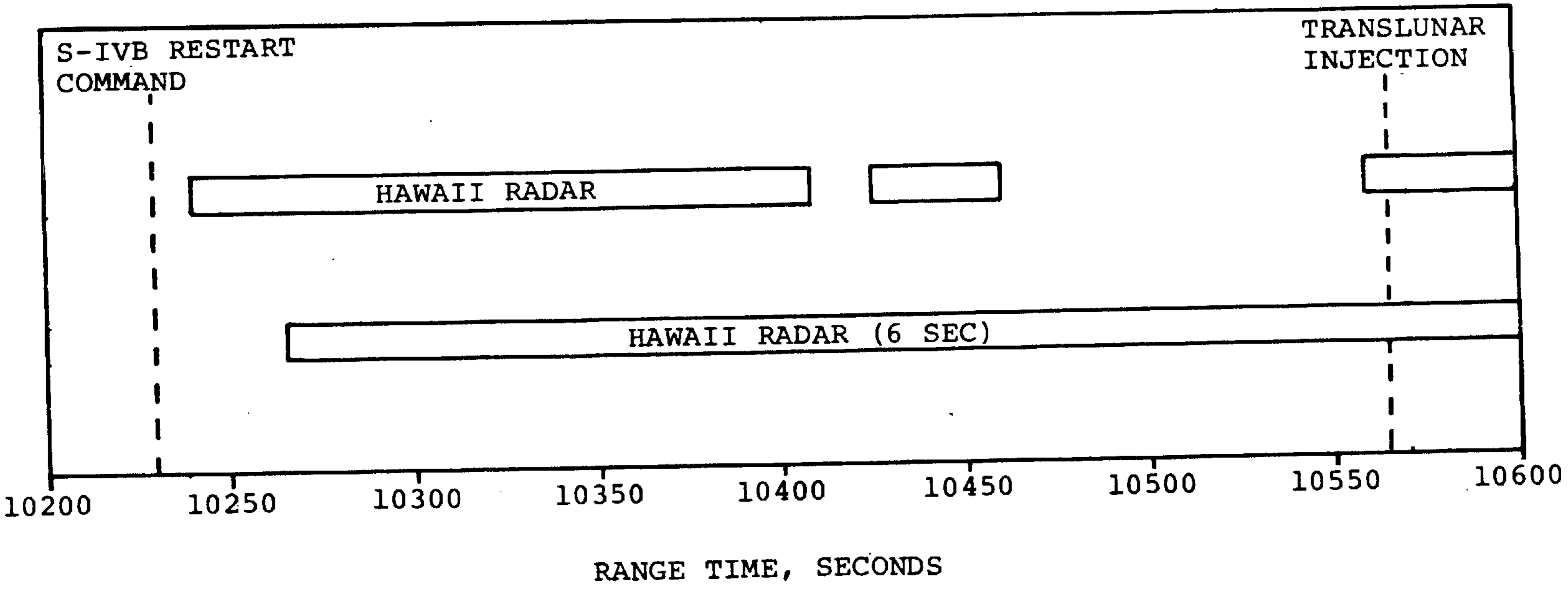

FIGURE 3-18. AVAILABLE TRACKING DATA - SECOND BURN PHASE

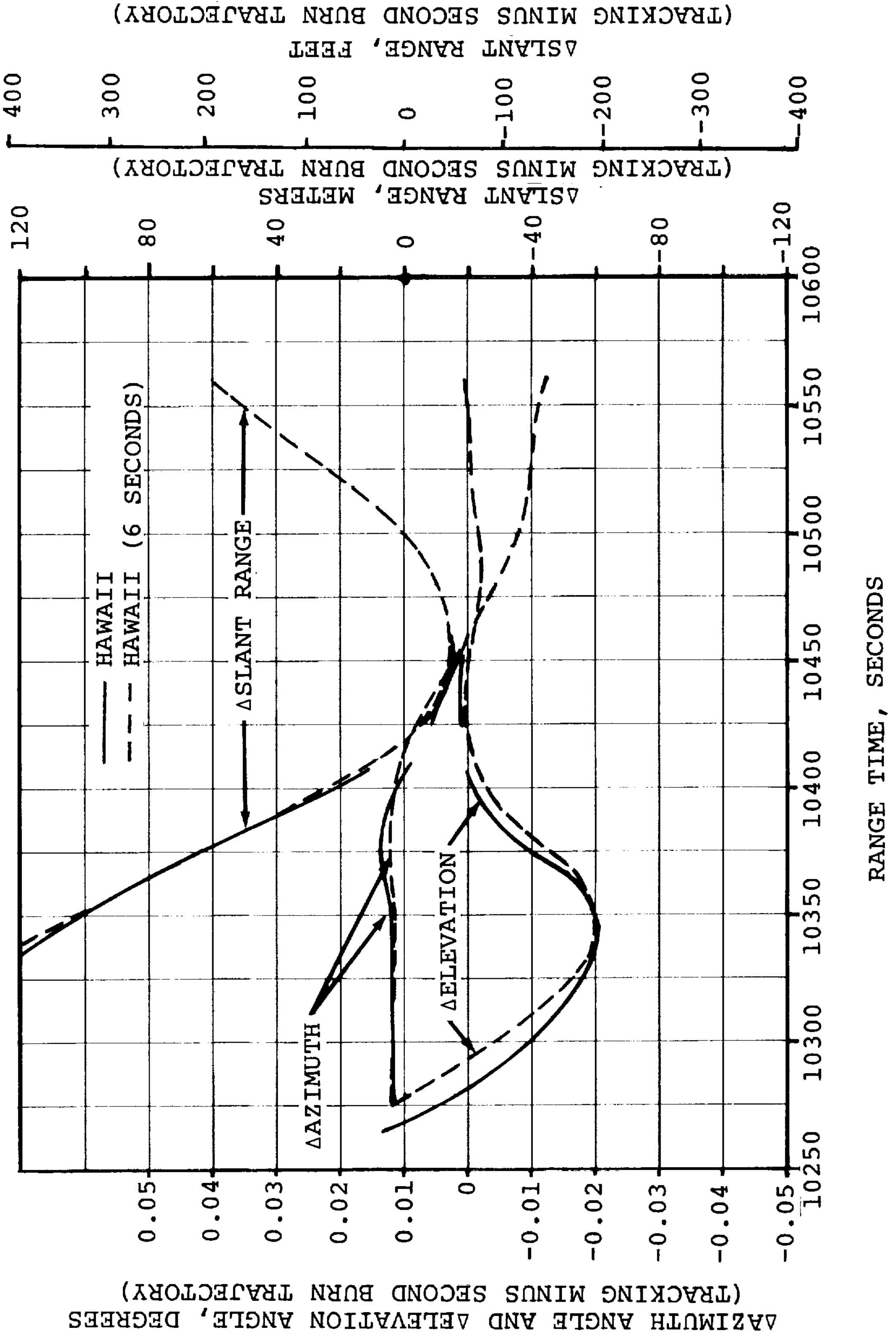

FIGURE 3-19. MEASURED PARAMETER TRACKING COMPARISONS - SECOND BURN PHASE

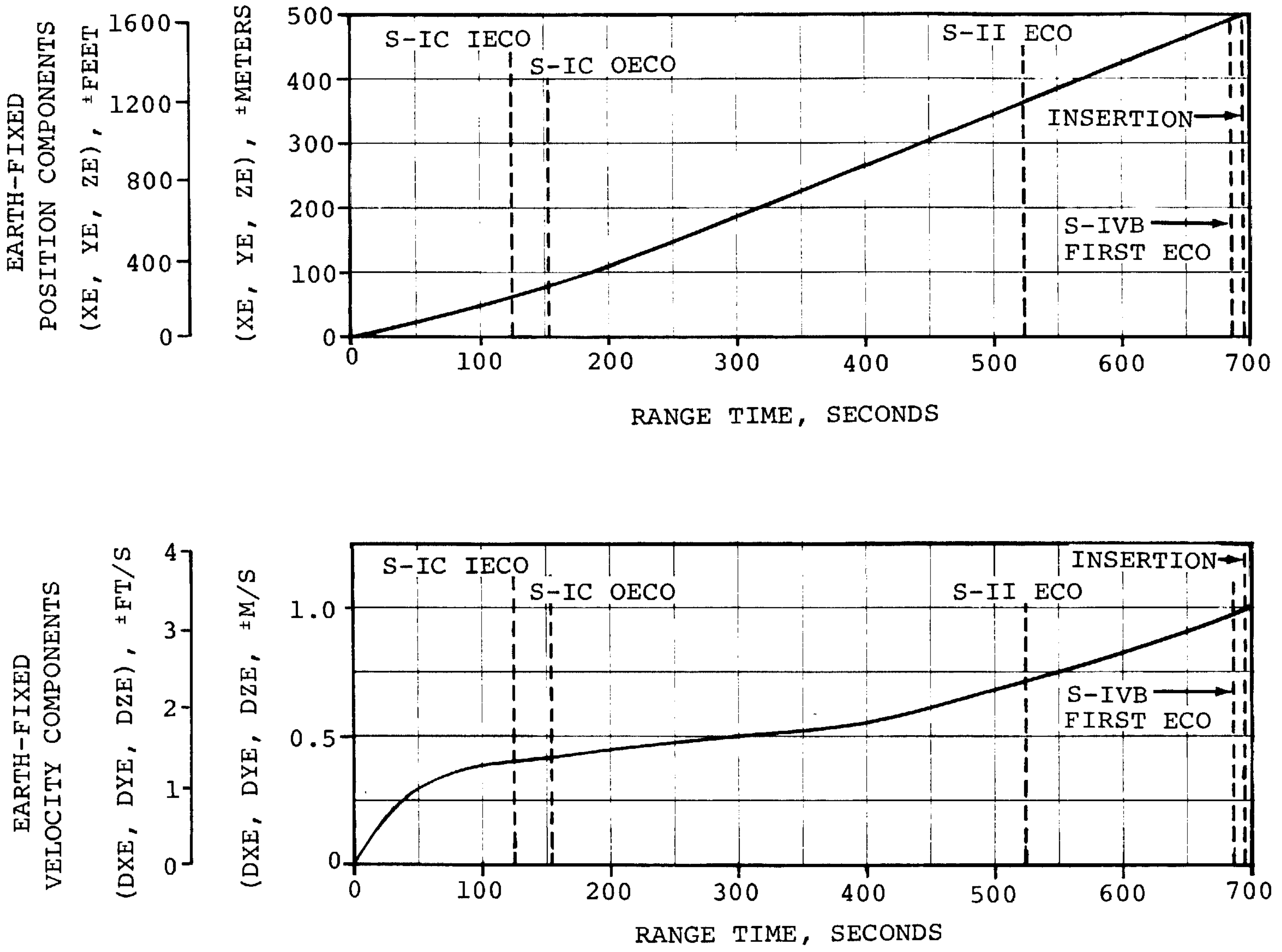

FIGURE 3-20. ESTIMATED UNCERTAINTY OF ASCENT PHASE TRAJECTORY

TABLE 3-I. TIMES OF EVENTS

EVENT	RANGE TIME, SEC		
	ACTUAL	NOMINAL	ACT - NOM
Guidance Reference Release	-16.97	-16.92	-0.05
First Motion	0.33	0.33	0.00
IU Umbilical Disconnect	0.67	0.72	-0.05
Mach 1	61.45	60.58	0.87
Maximum Dynamic Pressure	78.90	76.08	2.82
S-IC Inboard Engine Cutoff	125.88	125.92	-0.04
S-IC Outboard Engine Cutoff	153.82	151.37	2.45
S-IC/S-II Separation Command	154.47	152.07	2.40
S-II Engine Cutoff	524.04	521.19	2.85
S-II/S-IVB Separation Command	524.90	521.99	2.91
S-IVB 1st Guidance Cutoff	684.98	683.99	0.99
Orbital Insertion	694.98	693.99	0.99
Initiate S-IVB Restart Sequence	9,659.54	9,658.83	0.71
S-IVB 2nd Guidance Cutoff	10,555.51	10,552.28	3.23
Translunar Injection	10,565.51	10,562.28	3.23
Spacecraft Separation Sequence Start	12,056.3	12,052.5	3.8
S-IVB/CSM Physical Separation	12,059.3	12,055.5	3.8

TABLE 3-II. SIGNIFICANT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
First Motion	Range Time, sec	0.33
	Total Inertial Acc'n, m/s^2	11.41
	(ft/s^2)	(37.43)
Mach 1	Range Time, sec	61.45
	Altitude, km	7.35
	(n mi)	(3.97)
Maximum Dynamic Pressure	Range Time, sec	78.90
	Dynamic Pressure, N/cm^2	3.720
	(lb/ft^2)	(776.938)
	Altitude, km	13.43
	(n mi)	(7.25)
Maximum Total Inertial Acceleration: S-IC	Range Time, sec	153.92
	Acceleration, m/s^2	38.85
	(ft/s^2)	(127.46)
S-II	Range Time, sec	524.14
	Acceleration, m/s^2	18.20
	(ft/s^2)	(59.71)
S-IVB 1st Burn	Range Time, sec	685.08
	Acceleration, m/s^2	7.04
	(ft/s^2)	(23.10)
S-IVB 2nd Burn	Range Time, sec	10,555.61
	Acceleration, m/s^2	15.17
	(ft/s^2)	(49.77)
Maximum Earth-Fixed Velocity: S-IC	Range Time, sec	154.47
	Velocity, m/s	2,355.30
	(ft/s)	(7,727.36)
S-II	Range Time, sec	524.90
	Velocity, m/s	6,421.57
	(ft/s)	(21,068.14)
S-IVB 1st Burn	Range Time, sec	685.50
	Velocity, m/s	7,389.65
	(ft/s)	(24,244.26)
S-IVB 2nd Burn	Range Time, sec	10,556.00
	Velocity, m/s	10,417.68
	(ft/s)	(34,178.74)

TABLE 3-III. ENGINE CUTOFF CONDITIONS - ASCENT PHASE

PARAMETER	S-IC IECO	S-IC OECO	S-II ECO	S-IVB ECO
Range Time, sec	125.88	153.82	524.04	684.98
Altitude, km (n mi)	41.48 (22.40)	65.75 (35.50)	191.54 (103.42)	191.36 (103.33)
Surface Range, km (n mi)	42.05 (22.71)	89.46 (48.30)	1,504.32 (812.27)	2,577.30 (1,391.63)
Space-Fixed Velocity, m/s (ft/s)	1,893.96 (6,213.78)	2,712.65 (8,899.77)	6,821.15 (22,379.10)	7,791.43 (25,562.43)
Flight Path Angle, deg	24.527	20.699	0.646	-0.001
Heading Angle, deg	76.572	75.387	81.777	88.098
Cross Range, km (n mi)	0.49 (0.26)	0.62 (0.33)	23.11 (12.48)	57.08 (30.82)
Cross Range Velocity, m/s (ft/s)	5.10 (16.73)	4.94 (16.21)	160.43 (526.35)	265.72 (871.78)

TABLE 3-IV. STAGE SEPARATION CONDITIONS - ASCENT PHASE

PARAMETER	S-IC/S-II SEPARATION COMMAND	S-II/S-IVB SEPARATION COMMAND
Range Time, sec	154.47	524.90
Altitude, km (n mi)	66.37 (35.84)	191.61 (103.46)
Surface Range, km (n mi)	90.84 (49.05)	1,509.67 (815.16)
Space-Fixed Velocity, m/s (ft/s)	2,721.91 (8,930.15)	6,824.96 (22,391.60)
Flight Path Angle, deg	20.605	0.636
Heading Angle, deg	75.384	81.807
Cross Range, km (n mi)	0.62 (0.33)	23.24 (12.55)
Cross Range Velocity, m/s (ft/s)	5.04 (16.53)	160.89 (527.85)
Geodetic Latitude, deg N	28.852	31.728
Longitude, deg E	-79.717	-65.334

TABLE 3-V. TRANSLUNAR INJECTION CONDITIONS

PARAMETER	VALUE
Range Time, sec	10,565.51
Altitude, km (n mi)	346.73 (187.22)
Space-Fixed Velocity, m/s (ft/s)	10,822.05 (35,505.41)
Flight Path Angle, deg	7.897
Heading Angle, deg	67.494
Inclination, deg	30.636
Descending Node, deg	38.983
Eccentricity	0.97553
C_3*, m^2/s^2 (ft^2/s^2)	-1,478,917 (-15,918,930)
Geodetic Latitude, deg N	21.477
Longitude, deg E	-143.924

* C_3 is twice the specific energy of orbit

$$C_3 = V^2 - \frac{2\mu}{R}$$

V = inertial velocity

μ = gravitational constant

R = radius vector from center of earth

TABLE 3-VI. TARGETING PARAMETERS

PARAMETER	ACTUAL	NOMINAL	ACT - NOM
S-IVB 1ST GUIDANCE CUTOFF			
Range Time, sec	684.98	683.99	0.99
Altitude, km (n mi)	191.36 (103.33)	191.38 (103.34)	-0.02 (-0.01)
Space-Fixed Velocity, m/s (ft/s)	7,791.43 (25,562.43)	7,790.99 (25,560.99)	0.44 (1.44)
Flight Path Angle, deg	-0.001	-0.003	0.002
TRANSLUNAR INJECTION			
Range Time, sec	10,565.51	10,562.28	3.23
Eccentricity	0.97553	0.97636	-0.00083
C_3, m^2/s^2 (ft^2/s^2)	-1,478,917 (-15,918,930)	-1,429,286 (-15,384,706)	-49,631 (-534,224)
Inclination, deg	30.636	30.611	0.025
Descending Node, deg	38.983	38.940	0.043

TABLE 3-VII. AVAILABLE TRACKING DATA - POWERED FLIGHT TRAJECTORY

DATA SOURCE	TIME AVAILABLE (SEC)
ASCENT PHASE	
Fixed Cameras (PVA)*	1 - 13
Theodolites (PVA)*	10 - 64
ODOP (PVA)*	0 - 106
Cape Kennedy (1.16) Radar (FPS-16)**	0 - 299
Patrick (0.18) Radar (FPQ-6)**	23 - 58 85 - 550
Merritt Island (19.18) Radar (TPQ-18)**	0 - 71 152 - 523
Grand Bahama (3.18) Radar (TPQ-18)**	92 - 523
Grand Turk (7.18) Radar (TPQ-18)**	206 - 607
Bermuda (67.16) Radar (FPS-16)**	309 - 777
Bermuda (67.18) Radar (FPQ-6)**	254 - 767
SECOND BURN PHASE	
Hawaii Radar (FPS-16)** - 6 sec	10,266 - 10,644
Hawaii Radar (FPS-16)**	10,240 - 10,408 10,425 - 10,460 10,559 - 10,674

* PVA - Metric Position, Velocity and Acceleration Components (PACSS10)

** Measured Parameters in Azimuth Angle, Elevation Angle, and Slant Range (PACSS3a)

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SECTION 4

ORBITAL TRAJECTORY ANALYSIS

4.1 ORBITAL TRAJECTORY

The S-IVB/CSM was inserted into a circular parking orbit at 694.98 seconds. For approximately two revolutions, vehicle subsystem checkout was carried out from the tracking stations and Mission Control Center at Houston. During the second revolution near Hawaii, the S-IVB stage was restarted and the vehicle was placed onto a free-return circumlunar trajectory. The S-IVB/CSM physical separation occurred at 12,059.3 seconds.

The parking orbit insertion conditions were very close to nominal. The space-fixed velocity at insertion was 0.01 m/s (0.03 ft/s) less than nominal and the flight path angle was 0.001 degree greater than nominal. The eccentricity was 0.00001 greater than nominal. The apogee and perigee were 0.03 km (0.02 n mi) and 0.16 km (0.09 n mi) less than nominal, respectively.

The insertion conditions, as determined by the Orbital Correction Program (OCP), were obtained by a differential correction procedure which adjusted the estimated insertion conditions to fit the C-band radar tracking data in accordance with the weights assigned to the data. After all available C-band radar tracking data were analyzed, some stations and passes were eliminated completely from use in the determination of the insertion conditions. The orbital trajectory was obtained by integrating forward at the desired time intervals using the insertion vector as the initial conditions.

4.2 ORBITAL DATA SOURCES

4.2.1 Orbital Tracking

Orbital tracking was conducted by the NASA Manned Space Flight Network (MSFN). A summary of the C-band radar tracking data is given in Table 4-I. The Unified S-band (USB) data were received but were not used in the orbital solution. The USB data were not utilized for several reasons; there was an abundance of C-band tracking, the USB data arrived late, and lack of confidence in USB data application to the orbit solution.

4.2.2 Orbital Venting Acceleration Data

During the orbit, no major thrusting occurred; however, the orbit was continuously perturbed by low-level LH_2 venting thrust. To accurately model the orbit of the vehicle, this perturbation was taken into account. The venting model was

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4.2.2 (Continued)

derived from telemetered guidance velocity data from the ST-124M guidance platform. The guidance velocity data were fitted in segments by polynomials in time. These polynomials were analytically differentiated to obtain the acceleration components measured by the guidance platform. Table 4-II lists the acceleration polynomials derived by this method. Figure 4-1 reflects the best estimate of the total venting acceleration (RSS of components) after atmospheric effects and biases have been removed. The accelerometer biases as estimated in the OCP closely agree with the preflight laboratory measurements.

4.3 TRAJECTORY ANALYSIS

4.3.1 Orbital Insertion Conditions

The Orbital Correction Program (OCP) was used to solve for the insertion conditions utilizing C-band tracking data and the above mentioned vent model. The insertion conditions are given in Table 4-III. A family of values for the insertion parameters was obtained depending upon the combination of data used and the weights applied to the data. The solutions had a spread of ±500 m (±1640 ft) in position components and ±1.0 m/s (±3.3 ft/s) in velocity components referenced to the earth-fixed launch site coordinate system (PACSS10). The orbital insertion conditions determined independently from powered flight tracking lie within this band of solutions. The ground track from parking orbit insertion to S-IVB/CSM physical separation is given in Figure 4-2. The orbital trajectory in PACSS1 is given in Tables B-IV and C-IV.

4.3.2 Orbital Tracking Analysis

The stations used to obtain the initial orbital conditions, number of data points, and the Root-Mean-Square (RMS) errors of the residuals of each data type are shown in Table 4-IV. These RMS errors represent the difference between the actual radar observations and the calculated observations based on the orbital ephemeris defined by the initial conditions. The RMS residual errors include high frequency errors (assumed Gaussian), systematic errors due to instrumentation biases, mathematical model error, and errors in the correction for atmospheric refraction. The maximum RMS error of the radar residuals was 3 m (10 ft) in slant range, 0.023 degree in elevation angle, and 0.009 degree in azimuth angle. Design specifications indicate the expected high frequency errors of the measuring systems are 3 m (10 ft) in slant range and 0.005 degree in angles for the TPQ-18 and FPQ-6 radars; 6 m (20 ft) in slant range and 0.01 degree in angles for the FPS-16 radars.

4.4 POST TLI TRAJECTORY

The post translunar injection (TLI) trajectory spans the time interval from translunar injection (10,565.51 seconds) to S-IVB/CSM physical separation (12,059.3 seconds). The post TLI trajectory was obtained by integrating the translunar injection conditions to S-IVB/CSM physical separation. The separation conditions are presented in Table 4-V. The post TLI trajectory is included in Tables B-V through B-VII in metric units and Tables C-V through C-VII in English units. The Merritt Island USB data from 10,900 seconds to separation were received. These data aided in the verification of the validity of the post TLI trajectory.

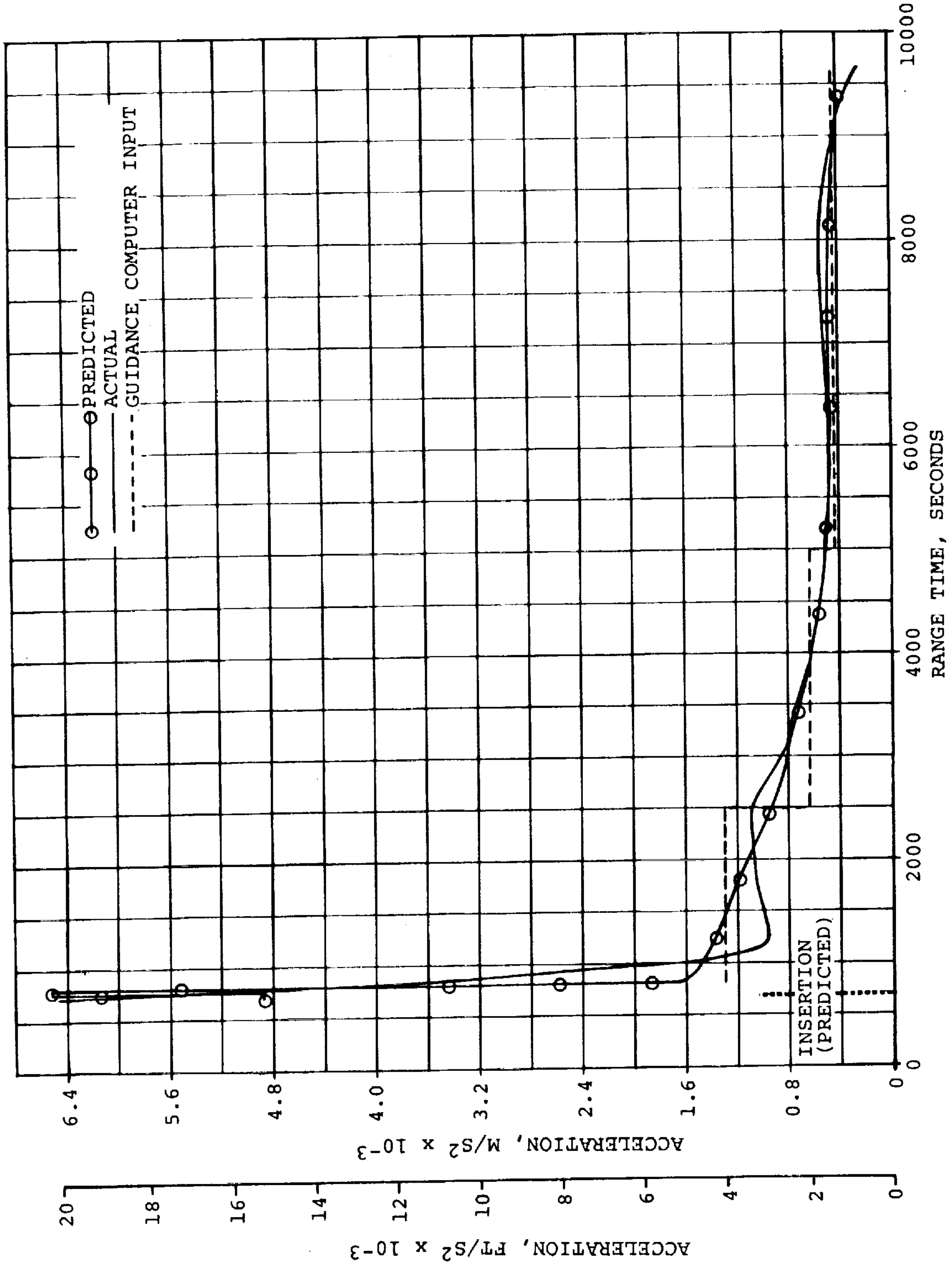

FIGURE 4-1. ORBITAL ACCELERATION DUE TO VENTING

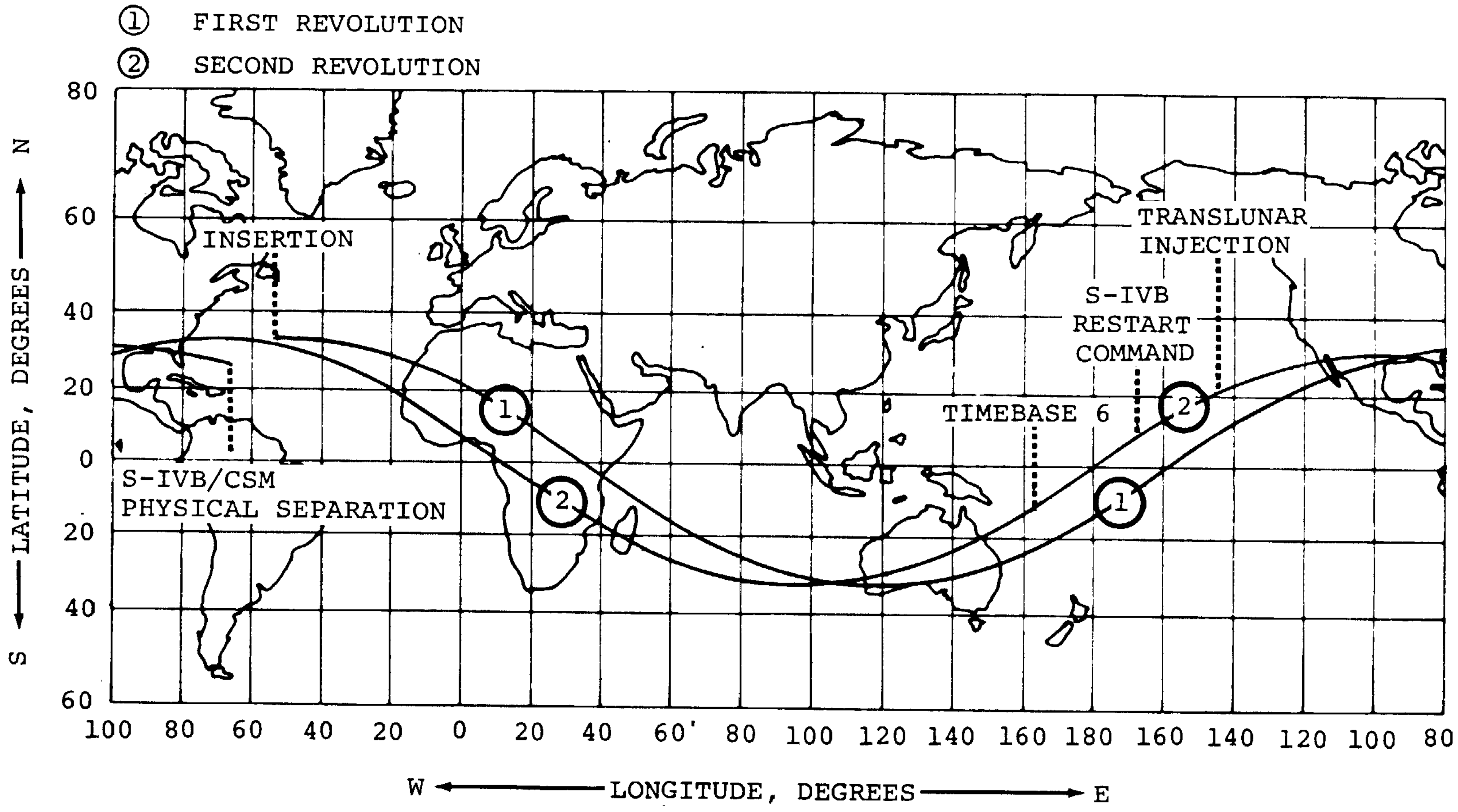

FIGURE 4-2. GROUND TRACK

TABLE 4-I. SUMMARY OF ORBITAL C-BAND TRACKING DATA AVAILABLE

STATION	TYPE OF RADARS	REV 1	REV 2	POST TLI
Bermuda	FPS-16M	X		
Tananarive	FPS-16M	X	X	
Carnarvon	FPQ-6	X	X	
White Sands	FPS-16M	X		
Patrick	FPQ-6		X	
Merritt Island	TPQ-18		X	
Bermuda	FPQ-6		X	
Vanguard Ship	FPS-16M		X	
Grand Turk	TPQ-18		X	
Pretoria	MPS-25M		X	
Mercury Ship	FPS-16M		X	
Hawaii	FPS-16M			X

TABLE 4-II. ORBITAL VENTING ACCELERATION POLYNOMIALS*

	$\ddot{X}$ **	
T_b	712	3,904
T_e	3,904	9,642
C_0	$-0.19836610\text{x}10^{-5}$	$0.56857351\text{x}10^{-6}$
C_1	$0.47609288\text{x}10^{-8}$	$0.15580062\text{x}10^{-9}$
C_2	$-0.77318597\text{x}10^{-11}$	$-0.41142879\text{x}10^{-12}$
C_3	$0.52935216\text{x}10^{-14}$	$0.46766935\text{x}10^{-16}$
C_4	$-0.15143808\text{x}10^{-17}$	$0.20397746\text{x}10^{-19}$
C_5	$0.15441217\text{x}10^{-21}$	$-0.29984645\text{x}10^{-23}$

		$\ddot{Z}$	
T_b	712	3,005	5,220
T_e	3,005	5,520	9,642
C_0	$0.63248851\text{x}10^{-5}$	$-0.62208112\text{x}10^{-6}$	$0.62048087\text{x}10^{-6}$
C_1	$-0.28689953\text{x}10^{-7}$	$0.26904016\text{x}10^{-10}$	$0.19504179\text{x}10^{-9}$
C_2	$0.49411078\text{x}10^{-10}$	$0.13959367\text{x}10^{-11}$	$-0.39077109\text{x}10^{-12}$
C_3	$-0.39363772\text{x}10^{-13}$	$-0.11742975\text{x}10^{-14}$	$-0.37977930\text{x}10^{-16}$
C_4	$0.14400828\text{x}10^{-16}$	$0.43605311\text{x}10^{-18}$	$0.63984846\text{x}10^{-19}$
C_5	$-0.19623030\text{x}10^{-20}$	$-0.63395453\text{x}10^{-22}$	$-0.86950281\text{x}10^{-23}$

	$\ddot{Y}$
T_b	712
T_e	9,642
C_0	$-0.36433125\text{x}10^{-6}$
C_1	$0.43502071\text{x}10^{-10}$
C_2	$-0.37878372\text{x}10^{-14}$
C_3	$-0.49114872\text{x}10^{-18}$
C_4	$0.54884058\text{x}10^{-22}$
C_5	0

*Polynomials are of the form $a=C_0+C_1t+C_2t^2+C_3t^3+C_4t^4+C_5t^5$

where a is the acceleration component (km/s^2) and $t=T-T_b$ where $T_b \leq T < T_e$. The begin time (T_b) and the end time (T_e) for the polynomial segments are expressed in seconds.

**The acceleration components are expressed in the launch vehicle platform-accelerometer system (PACSS12).

TABLE 4-III. PARKING ORBIT INSERTION CONDITIONS

PARAMETER	VALUE
Range Time, sec	694.98
Altitude, km (n mi)	191.36 (103.33)
Space-Fixed Velocity, m/s (ft/s)	7,792.84 (25,567.06)
Flight Path Angle, deg	0.0006
Heading Angle, deg	88.532
Inclination, deg	32.509
Descending Node, deg	42.415
Eccentricity	0.00006
Apogee*, km (n mi)	185.18 (99.99)
Perigee*, km (n mi)	184.41 (99.57)
Period, min	88.19
Geodetic Latitude, deg N	32.649
Longitude, deg E	-53.292

* Based on a spherical earth of radius 6,378.165 km (3,443.934 n mi).

TABLE 4-IV. ORBITAL TRACKING UTILIZATION SUMMARY

STATION	TIME OF TRACK (SECONDS)		DATA TYPE	VALID OBSERVATIONS	RMS ERROR OF RESIDUALS
	BEGIN	END			
Bermuda	696	744	Azimuth Angle	6	0.008 deg
(FPS-16M)			Elevation Angle	6	0.023 deg
Rev. 1			Slant Range	5	2 m (7 ft)
Carnarvon	3,222	3,396	Azimuth Angle	25	0.006 deg
(FPQ-6)			Elevation Angle	25	0.010 deg
Rev. 1			Slant Range	23	1 m (3 ft)
Merritt Island	5,778	6,048	Azimuth Angle	38	0.009 deg
(TPQ-18)			Elevation Angle	35	0.004 deg
Rev. 2			Slant Range	33	3 m (10 ft)
Carnarvon	8,820	9,036	Azimuth Angle	31	0.005 deg
(FPQ-6)			Elevation Angle	31	0.005 deg
Rev. 2			Slant Range	31	2 m (7 ft)

TABLE 4-V. S-IVB/CSM PHYSICAL SEPARATION CONDITIONS

PARAMETER	VALUE
Range Time, sec	12,059.3
Altitude, km (n mi)	7,033.48 (3,797.78)
Space-Fixed Velocity, m/s (ft/s)	7,612.35 (24,974.90)
Flight Path Angle, deg	45.110
Heading Angle, deg	107.122
Geodetic Latitude, deg N	25.863
Longitude, deg E	-66.232

SECTION 5

FREE FLIGHT TRAJECTORIES

5.1 S-IC FREE FLIGHT TRAJECTORY

Postflight predictions of earth surface impact parameters for the spent S-IC stage were computed using a mass point trajectory simulation computer program. S-IC postflight burn-out position and velocity data were combined with nominal main propulsion system decay performance and nominal retro-rocket performance to initialize the simulation program.

Three separate theoretical trajectories were computed for the spent S-IC stage. These three trajectories represent the following booster atmospheric entry conditions:

a. Zero degree angle-of-attack entry
b. Ninety degree angle-of-attack entry
c. Tumbling entry

The tumbling booster case is considered to define actual case impact conditions although no tracking coverage was available for confirmation.

Results of the three computed S-IC spent stage trajectories are summarized in Table 5-I. The ground track is shown in Figure 5-1. The S-IC stage trajectory is given in both metric and English units in Tables B-VIII and C-VIII, respectively.

5.2 S-II FREE FLIGHT TRAJECTORY

Three separate theoretical trajectories, corresponding to the zero degree, ninety degree, and tumbling case trajectories computed for the S-IC stage, were computed for the spent S-II stage.

The computed results, assuming a tumbling stage, were considered to define stage impact conditions since no tracking coverage of the spent S-II stage was available.

Results of the three computed S-II spent-stage trajectories are summarized in Table 5-II. The ground track is shown in Figure 5-1. The S-II stage trajectory is given in both metric and English units in Tables B-IX and C-IX, respectively.

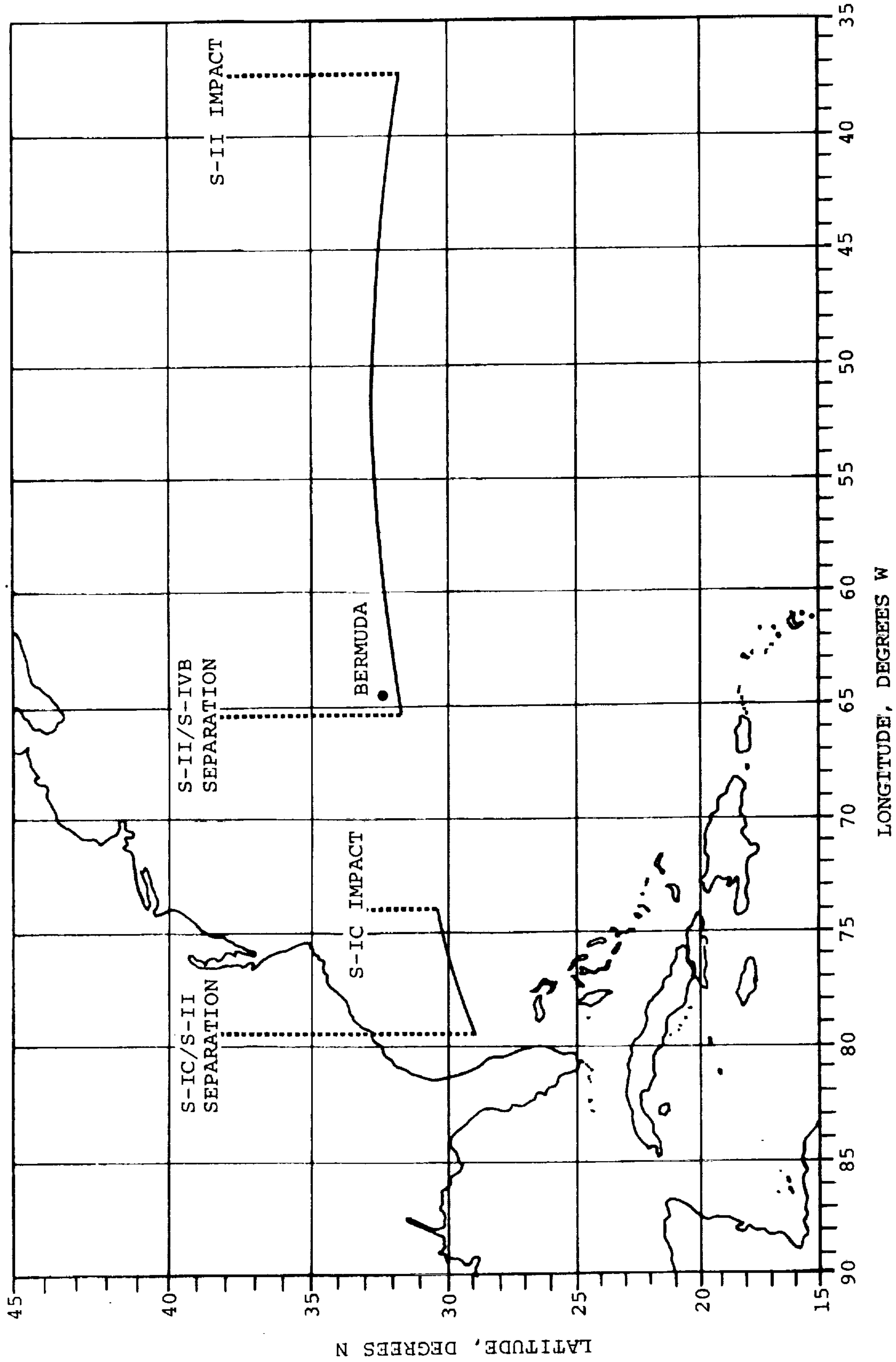

FIGURE 5-1. GROUND TRACKS FOR S-IC AND S-II SPENT STAGES

TABLE 5-I. S-IC FREE FLIGHT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Impact Time, sec	540.41
	Impact Latitude, deg N	30.20
	Impact Longitude, deg E	-74.11
	Impact Range, km (n mi)	654.61 (353.46)
Impact: 0° Angle-of-Attack	Impact Time, sec	500.89
	Impact Latitude, deg N	30.22
	Impact Longitude, deg E	-74.02
	Impact Range, km (n mi)	663.56 (358.29)
Impact: 90° Angle-of-Attack	Impact Time, sec	573.84
	Impact Latitude, deg N	30.19
	Impact Longitude, deg E	-74.17
	Impact Range, km (n mi)	648.49 (350.16)
Apex: Tumbling Case	Range Time, sec	266.54
	Altitude, km (n mi)	119.81 (64.69)
	Surface Range, km (n mi)	325.39 (175.69)

TABLE 5-II. S-II FREE FLIGHT TRAJECTORY PARAMETERS

EVENT	PARAMETER	VALUE
Impact: Tumbling Case	Impact Time, sec	1,165.11
	Impact Latitude, deg N	31.83
	Impact Longitude, deg E	-37.28
	Impact Range, km (n mi)	4,159.43 (2,245.91)
Impact: 0° Angle-of-Attack	Impact Time, sec	1,132.33
	Impact Latitude, deg N	31.80
	Impact Longitude, deg E	-37.04
	Impact Range, km (n mi)	4,182.59 (2,258.42)
Impact: 90° Angle-of-Attack	Impact Time, sec	1,202.59
	Impact Latitude, deg N	31.86
	Impact Longitude, deg E	-37.53
	Impact Range, km (n mi)	4,135.74 (2,233.12)
Apex Tumbling Case	Range Time, sec	560.34
	Altitude, km (n mi)	193.00 104.21
	Surface Range, km (n mi)	1,729.88 (934.06)

SECTION 6

S-IVB/IU POST SEPARATION TRAJECTORY

The S-IVB/IU was placed in a lunar slingshot trajectory close to nominal. This was accomplished by a combination of a continuous LH_2 vent, a LOX dump and APS ullage burns. A time history of the velocity increase along the S-IVB's longitudinal axis for the slingshot maneuver is presented in Figure 6-1. Table 6-I presents the velocity increases compared with nominal. The purpose of this maneuver was to slow down the S-IVB/IU to make it pass by the trailing edge of the moon and obtain sufficient energy to continue to a solar orbit. Figure 6-2 presents the resultant conditions for various velocity increases at the attitude of the vehicle for the maneuver. The nominal and the 3σ band about the nominal are included.

The S-IVB/IU closest approach of 1,262 km (681 n mi) above the lunar surface occurred at 69.982 hours into the mission. The point of closest approach was at 19.2 degrees N latitude and 88.0 degrees E longitude. The path of the S-IVB/IU was inclined 44.56 degrees to the lunar equatorial plane. The trajectory parameters were obtained by integrating forward a vector (furnished by GSFC) which was obtained from CCS tracking data during the active lifetime of the S-IVB/IU. The actual and nominal conditions at closest approach are presented in Table 6-II. The velocity of the S-IVB/IU relative to the earth is presented in Figure 6-3. This vividly illustrates how the influence of the moon imparted energy to the S-IVB/IU. Figure 6-4 presents the relationship between the spacecraft and the S-IVB/IU in the vicinity of the moon. Some of the heliocentric orbit parameters of the S-IVB/IU are presented in Table 6-III. Similar parameters for the earth's orbit are also presented for comparison.

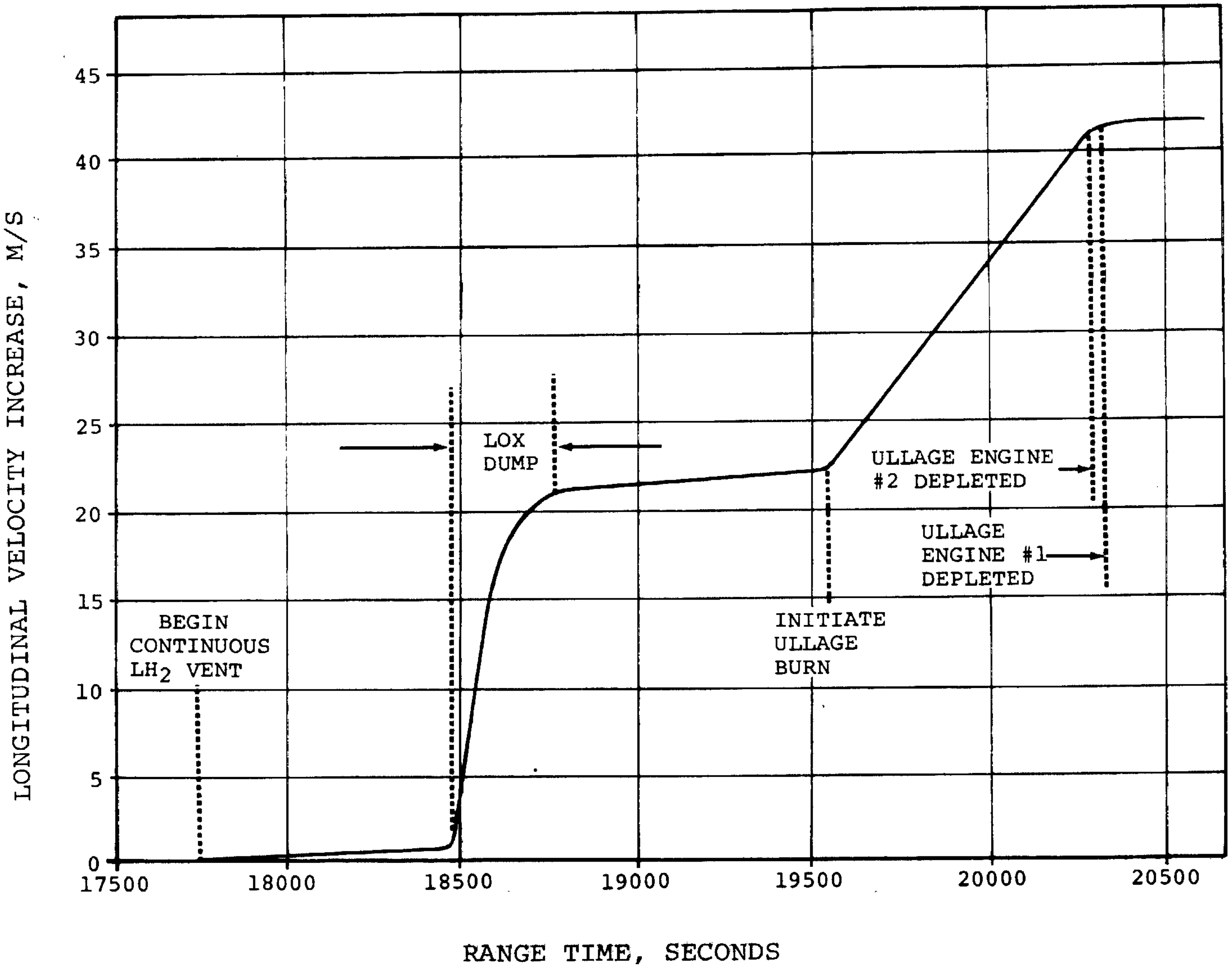

FIGURE 6-1. SLINGSHOT MANEUVER LONGITUDINAL VELOCITY INCREASE

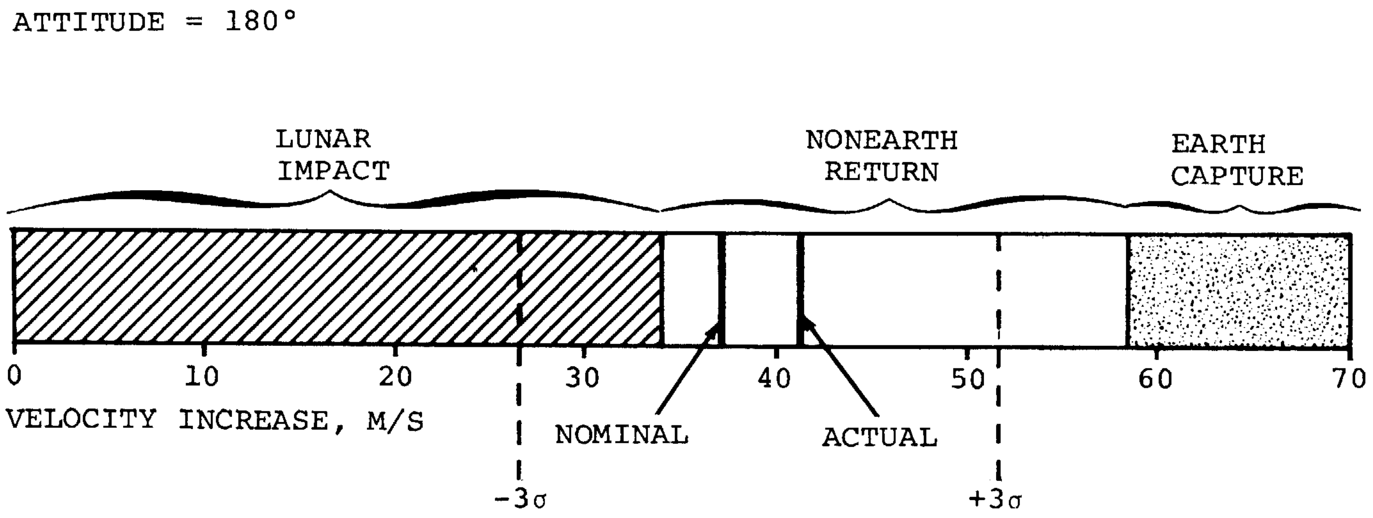

FIGURE 6-2. RESULTANT SLINGSHOT MANEUVER CONDITIONS

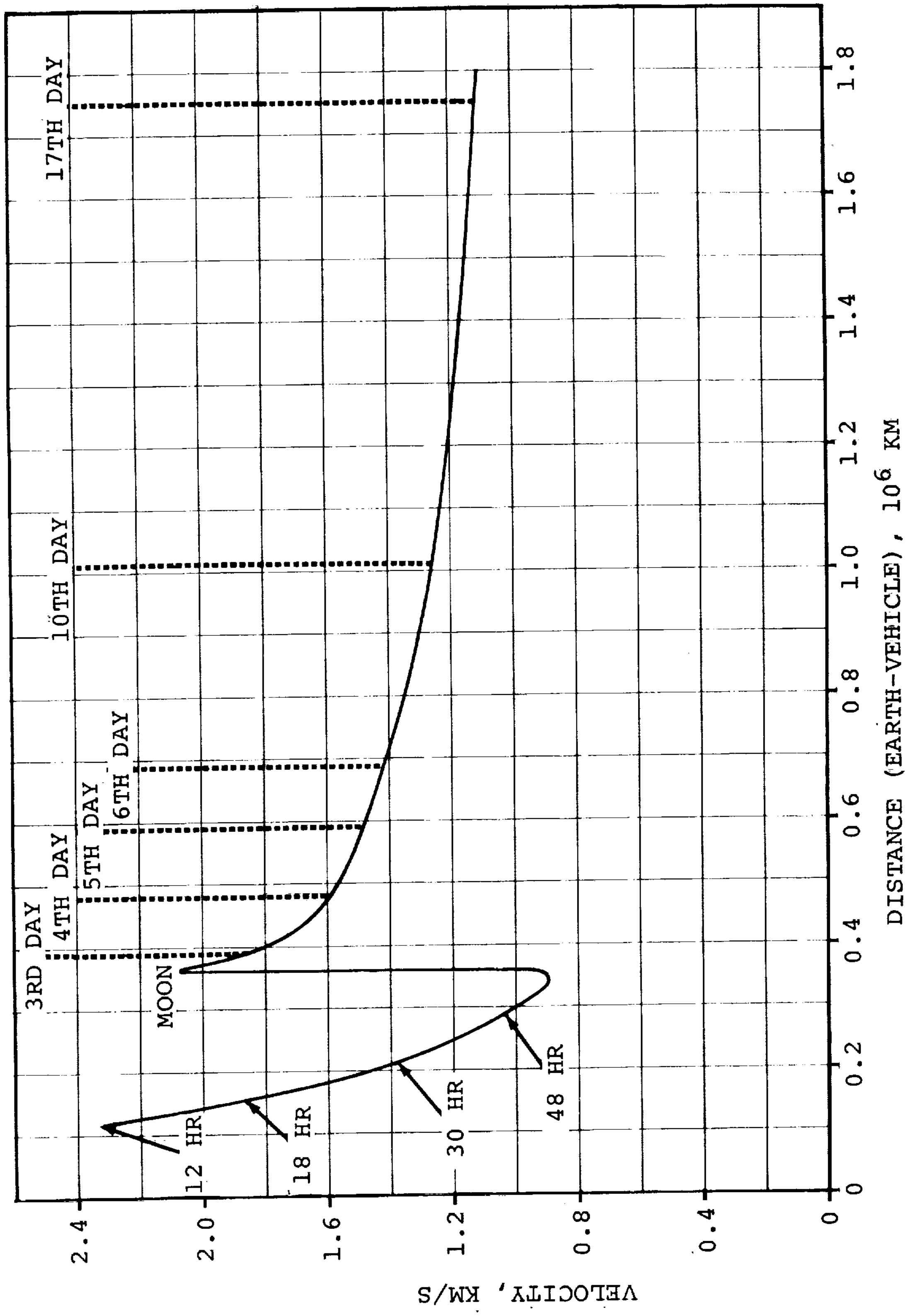

FIGURE 6-3. S-IVB/IU VELOCITY RELATIVE TO EARTH DISTANCE

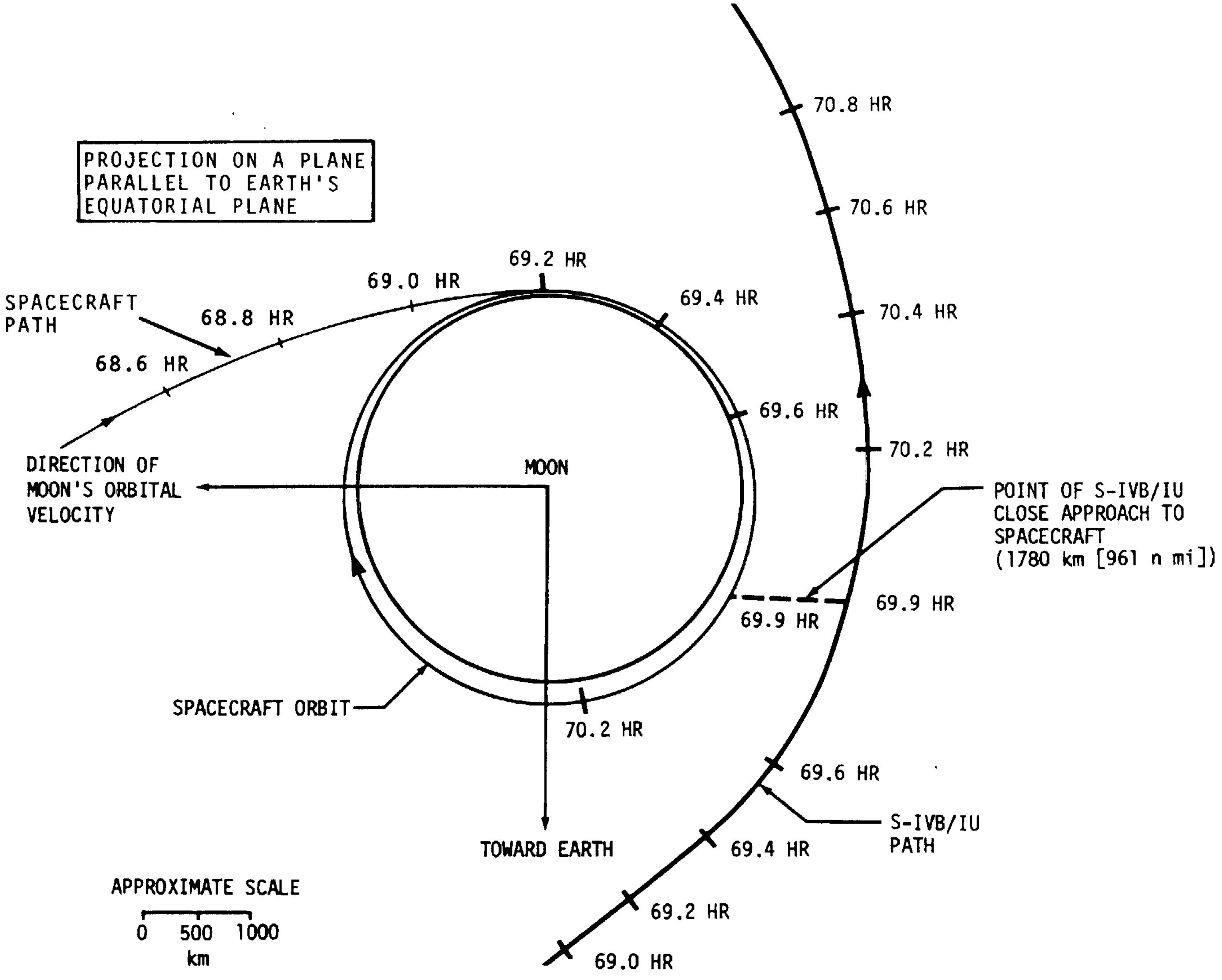

FIGURE 6-4. S-IVB/IU AND SPACECRAFT RELATIVE TRAJECTORIES

TABLE 6-I. COMPARISON OF SLINGSHOT MANEUVER

PARAMETER	ACTUAL	NOMINAL
Longitudinal Velocity Increase, m/s (ft/s)	41.9 (137.5)	37.0 (121.4)
LH_2 Vent, m/s (ft/s)	2.1 (6.9)	1.1 (3.6)
LOX Dump, m/s (ft/s)	20.4 (66.9)	18.0 (59.1)
APS Ullage Burn, m/s (ft/s)	19.4 (63.6)	17.9 (58.7)
APS Ullage Burn Time		
Engine #1, sec	758.2	714
Engine #2, sec	732.5	714

TABLE 6-II. LUNAR CLOSEST APPROACH PARAMETERS

PARAMETER	ACTUAL	NOMINAL
Lunar Radius of Closest Approach, km (n mi)	3,000 (1,620)	2,139 (1,155)
Altitude Above Lunar Surface, km (n mi)	1,262 (681)	401 (217)
Time from Launch, hr	69.982	69.964
Velocity Increase Relative to Earth from Lunar Influence, km/s (n mi/s)	1.46 (0.79)	1.84 (0.99)

TABLE 6-III. HELIOCENTRIC ORBIT PARAMETERS

PARAMETER	S-IVB/IU	EARTH
Semimajor Axis, km (n mi)	1.4284×10^8 (0.7713×10^8)	1.4900×10^8 (0.8045×10^8)
Aphelion, km (n mi)	1.4774×10^8 (0.7977×10^8)	1.5115×10^8 (0.8161×10^8)
Perihelion, km (n mi)	1.3795×10^8 (0.7449×10^8)	1.4684×10^8 (0.7929×10^8)
Inclination, deg *	23.47	23.44
Period, days	340.8	365.25

* For purposes of this report the solar equatorial plane is considered parallel to the earth's equatorial plane.

APPENDIX A

DEFINITIONS OF TRAJECTORY SYMBOLS AND COORDINATE SYSTEMS

SYMBOL	DEFINITION
XE, YE, ZE DXE, DYE, DZE DDXE, DDYE, DDZE	Position, velocity and acceleration components of vehicle center of gravity in Earth-Fixed Launch Site Coordinate System. The origin of this system is at the intersection of Fischer Ellipsoid (1960) and the normal to it which passes through the launch site. The X axis coincides with the ellipsoid normal passing through the site, positive upward. The Z axis is parallel to the earth-fixed flight azimuth, defined at guidance reference release time, and is positive down range. The Y axis completes a right-handed system. This coordinate system is identical to Standard Coordinate System 10 of Project Apollo Coordinate System Standards, abbreviated as PACSS10.
XSP, YSP, ZSP DXSP, DYSP, DZSP DDXSP, DDYSP, DDZSP	Position, velocity and acceleration components of vehicle center of gravity in Geocentric Inertial Coordinate System. The origin of this system is at the center of the earth. The X-Y plane is coincident with the equatorial plane. The X axis points through the Greenwich meridian at midnight or zero hour on the day of launch. The Z axis points north along the earth's axis of rotation (through the north pole). The Y axis completes a right-handed system. The direction of the coordinate axes remain fixed in space, and the origin moves with the center of earth. This coordinate system is related to Standard Coordinate System Standards, abbreviated as PACSS4. The PACSS4 is obtained from this coordinate system by a counter-clockwise rotation around the Z axis through an angle determined by the mean sidereal time at midnight or zero hour on the day of launch.

APPENDIX A (Continued)

SYMBOL	DEFINITION
GC DIST GC LAT GD LAT LONG	Position components of vehicle center of gravity in Geographic Polar Coordinate System. Position in this system is defined by the geocentric distance (GC DIST), geocentric latitude (GC LAT), geodetic latitude (GD LAT), and longitude (LONG). Geocentric distance is the distance from the geocenter to vehicle center of gravity. Geocentric latitude is the angle between the radius vector of the subvehicle point and the equatorial plane, positive north of the equatorial plane. Geodetic latitude is the angle between the normal to the Fischer Ellipsoid through the subvehicle point and the equatorial plane, positive north of the equatorial plane. Longitude is the angle between the projection of the radius vector into the equatorial plane and the Greenwich meridian, positive east of the Greenwich meridian. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
EF VEL VEL-AZ VEL-EL	Earth-fixed velocity of vehicle center of gravity in Geographic Polar Coordinate System. Velocity in this system is given in terms of azimuth (VEL-AZ), elevation (VEL-EL), and magnitude of the velocity vector (EF VEL). Azimuth is the angle between the projection of the velocity vector into the local horizontal plane and the north direction in this plane, positive east of north. Elevation is the angle between the velocity vector and the local horizontal plane, positive above the horizontal plane. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
SF VEL FLT-PATH HEAD	Space-fixed velocity of vehicle center of gravity in Geographic Polar Coordinate System. Velocity in this system is given in terms heading angle (HEAD), flight path angle (FLT-PATH), and magnitude of velocity vector (SF VEL). Heading angle is the angle between the projection of the velocity vector into the local horizontal plane and the north direction in this plane, positive east of north. Flight path angle is the angle between

APPENDIX A (Continued)

SYMBOL	DEFINITION
	the velocity vector and the local horizontal plane, positive above the horizontal plane. This coordinate system is identical to Standard Coordinate System 1 of Project Apollo Coordinate System Standards, abbreviated as PACSS1.
ALTITUDE	Perpendicular distance from vehicle center of gravity to Fischer Ellipsoid, positive above Fischer Ellipsoid.
LAT	Geodetic latitude of vehicle, positive north of the equatorial plane.
RANGE	Surface range measured along Fischer Ellipsoid from the launch site to the subvehicle point.
TIME	Range time, referenced to nearest integer second before IU umbilical disconnect.

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APPENDIX B

TIME HISTORY OF TRAJECTORY PARAMETERS - METRIC UNITS

The postflight trajectory, from guidance reference release to LV-LTA/CSM physical separation, is tabulated in metric units in Tables B-I through B-IX.

Table B-I gives the earth-fixed launch site position, velocity, and acceleration components for the ascent phase of the flight.

Table B-II gives the geocentric inertial position, velocity, and acceleration components for the ascent phase of the flight.

Table B-III gives the geographic polar coordinates for the ascent phase of flight.

Table B-IV gives the geographic polar coordinates for the orbital phase of flight.

Table B-V gives the earth-fixed launch site position, velocity, and acceleration components for the second burn phase of flight.

Table B-VI gives the geocentric inertial position, velocity, and acceleration components for the second burn phase of flight.

Table B-VII gives the geographic polar coordinates for the second burn phase of flight.

Table B-VIII gives the trajectory parameters for the S-IC spent stage.

Table B-IX gives the trajectory parameters for the S-II spent stage.

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TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
GUIDANCE REFERENCE RELEASE									
-16.970	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-0.0	60	0	0	0.0	0.0	0.0	0.0	0.0	0.0
FIRST MOTION									
0.330	60	0	0	0.0	0.0	0.0	1.62	-0.01	0.00
IU UMBILICAL DISCONNECT									
0.670	60	0	0	0.7	-0.0	0.0	2.15	-0.03	0.01
1.0	60	0	0	1.5	-0.0	0.0	2.52	-0.04	0.01
2.0	63	0	0	4.0	-0.1	0.0	2.56	-0.06	0.03
3.0	68	0	0	6.6	-0.1	0.1	2.63	-0.01	0.05
4.0	76	0	0	9.3	-0.0	0.1	2.71	0.16	0.04
5.0	86	0	0	12.0	0.1	0.2	2.78	0.21	0.03
6.0	100	0	0	14.8	0.4	0.2	2.87	0.26	0.02
7.0	116	1	1	17.7	0.6	0.2	2.92	0.28	0.00
8.0	135	1	1	20.7	0.9	0.2	2.96	0.29	-0.01
9.0	157	2	1	23.6	1.2	0.2	3.03	0.30	-0.02
10.0	183	4	1	26.7	1.5	0.2	3.10	0.29	-0.03
11.0	211	5	1	29.8	1.8	0.1	3.17	0.24	-0.03
12.0	242	7	1	33.1	2.0	0.1	3.23	0.14	-0.01
13.0	277	9	2	36.3	2.1	0.1	3.29	0.05	0.05
14.0	315	12	2	39.6	2.1	0.2	3.34	0.00	0.14

TABLE B-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
15.0	356	14	2	43.0	2.1	0.4	3.40	0.00	0.24
16.0	401	16	3	46.4	2.1	0.7	3.47	0.02	0.33
17.0	449	18	3	49.9	2.1	1.1	3.56	0.03	0.42
18.0	501	20	5	53.6	2.2	1.5	3.66	0.03	0.49
19.0	556	22	7	57.3	2.2	2.1	3.75	0.01	0.58
20.0	616	26	9	61.1	2.2	2.7	3.85	-0.02	0.68
21.0	679	29	12	65.0	2.1	3.4	3.94	-0.03	0.81
22.0	741	32	17	68.9	2.1	4.3	4.01	-0.04	0.92
23.0	810	34	23	72.9	2.1	5.2	4.08	-0.04	1.05
24.0	885	37	30	77.0	2.0	6.3	4.15	-0.03	1.18
25.0	964	39	37	81.2	2.0	7.6	4.22	-0.03	1.31
26.0	1047	41	45	85.5	2.0	9.0	4.29	-0.05	1.45
27.0	1135	42	54	89.8	1.9	10.5	4.36	-0.05	1.59
28.0	1227	44	66	94.2	1.9	12.2	4.44	-0.05	1.72
29.0	1323	46	79	98.7	1.8	13.9	4.53	-0.06	1.86
30.0	1424	48	94	103.3	1.7	15.9	4.61	-0.06	1.99
31.0	1530	50	111	107.9	1.7	17.9	4.69	-0.05	2.11
32.0	1640	51	130	112.7	1.6	20.1	4.77	-0.05	2.23
33.0	1755	53	151	117.5	1.6	22.4	4.85	-0.04	2.35
34.0	1875	55	174	122.4	1.6	24.8	4.93	-0.04	2.46
35.0	2000	56	200	127.3	1.5	27.3	5.00	-0.03	2.60
36.0	2130	58	229	132.4	1.5	30.0	5.09	-0.03	2.76
37.0	2265	59	260	137.5	1.5	32.8	5.17	-0.03	2.93
38.0	2405	60	295	142.7	1.4	35.8	5.25	-0.03	3.10
39.0	2550	62	332	148.0	1.4	39.0	5.33	-0.02	3.29
40.0	2701	63	373	153.4	1.4	42.4	5.40	-0.02	3.48
41.0	2857	65	417	158.8	1.4	46.0	5.48	-0.01	3.67
42.0	3018	66	465	164.3	1.4	49.8	5.55	-0.00	3.86
43.0	3186	67	517	169.9	1.4	53.7	5.62	-0.00	4.04
44.0	3358	69	572	175.5	1.4	57.8	5.70	0.01	4.21
45.0	3537	70	632	181.3	1.4	62.1	5.78	0.03	4.39
46.0	3721	72	697	187.1	1.4	66.6	5.86	0.06	4.58
47.0	3911	73	766	193.0	1.5	71.3	5.94	0.09	4.78
48.0	4107	75	840	199.0	1.6	76.2	6.02	0.12	4.97
49.0	4309	76	918	205.0	1.7	81.3	6.09	0.14	5.17
50.0	4517	78	1002	211.2	1.9	86.5	6.15	0.16	5.37
51.0	4731	80	1091	217.3	2.1	92.0	6.22	0.17	5.58
52.0	4952	82	1186	223.6	2.2	97.7	6.29	0.16	5.79
53.0	5178	84	1287	229.9	2.4	103.6	6.35	0.14	5.99
54.0	5412	87	1393	236.3	2.5	109.7	6.39	0.11	6.21
55.0	5651	89	1506	242.7	2.6	116.0	6.45	0.09	6.41
56.0	5897	92	1625	249.2	2.7	122.5	6.53	0.08	6.61
57.0	6149	95	1751	255.8	2.8	129.2	6.60	0.08	6.81

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
58.0	6409	98	1884	262.4	2.9	136.1	6.66	0.08	7.00
59.0	6674	101	2024	269.1	2.9	143.2	6.71	0.09	7.18
60.0	6947	104	2170	275.8	3.0	150.5	6.75	0.10	7.36
61.0	7226	107	2325	282.6	3.1	157.9	6.80	0.09	7.54
MACH 1									
61.450	7354	108	2397	285.6	3.2	161.3	6.80	0.09	7.62
62.0	7512	110	2486	289.4	3.2	165.6	6.82	0.08	7.73
63.0	7805	113	2656	296.2	3.3	173.4	6.84	0.06	7.93
64.0	8104	116	2833	303.1	3.3	181.4	6.88	0.03	8.14
65.0	8411	120	3019	310.0	3.4	189.7	6.92	0.02	8.35
66.0	8724	123	3213	317.0	3.4	198.1	6.99	0.03	8.58
67.0	9045	126	3415	324.0	3.4	206.8	7.08	0.05	8.80
68.0	9372	130	3626	331.1	3.5	215.7	7.17	0.08	9.02
69.0	9707	133	3847	338.3	3.6	224.9	7.25	0.11	9.26
70.0	10049	137	4076	345.6	3.7	234.2	7.34	0.16	9.48
71.0	10398	141	4315	353.0	3.9	243.8	7.46	0.19	9.69
72.0	10755	145	4564	360.5	4.1	253.6	7.55	0.21	9.93
73.0	11119	149	4822	368.1	4.3	263.7	7.64	0.22	10.17
74.0	11491	154	5091	375.8	4.6	274.0	7.71	0.24	10.43
75.0	11871	158	5370	383.5	4.8	284.6	7.77	0.26	10.72
76.0	12258	163	5660	391.3	5.1	295.4	7.83	0.28	11.04
77.0	12654	168	5961	399.2	5.4	306.7	7.87	0.29	11.39
78.0	13057	174	6274	407.1	5.6	318.2	7.89	0.29	11.76
MAXIMUM DYNAMIC PRESSURE									
78.900	13427	179	6565	414.2	5.9	329.0	7.87	0.28	12.13
79.0	13468	180	6598	414.9	5.9	330.2	7.87	0.28	12.17
80.0	13887	186	6934	422.8	6.2	342.6	7.84	0.25	12.59
81.0	14313	192	7283	430.6	6.4	355.4	7.80	0.22	13.03
82.0	14748	199	7645	438.4	6.6	368.6	7.75	0.19	13.49
83.0	15190	205	8021	446.1	6.8	382.4	7.68	0.18	13.95
84.0	15640	212	8410	453.8	7.0	396.5	7.63	0.17	14.40
85.0	16098	219	8814	461.4	7.2	411.1	7.58	0.18	14.84
86.0	16563	227	9233	468.9	7.3	426.2	7.55	0.17	15.27
87.0	17036	234	9667	476.5	7.5	441.7	7.53	0.15	15.69
88.0	17516	242	10116	484.0	7.6	457.6	7.51	0.12	16.09
89.0	18004	249	10582	491.5	7.7	473.8	7.50	0.09	16.47
90.0	18499	257	11064	499.0	7.8	490.5	7.50	0.05	16.84
91.0	19002	265	11563	506.5	7.8	507.6	7.51	0.01	17.21
92.0	19512	273	12079	514.0	7.8	524.9	7.53	-0.03	17.57

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
93.0	20030	280	12613	521.6	7.8	542.6	7.55	-0.07	17.89
94.0	20555	288	13165	529.1	7.7	560.7	7.57	-0.10	18.23
95.0	21088	296	13734	536.7	7.6	579.1	7.60	-0.10	18.58
96.0	21628	303	14323	544.3	7.5	597.9	7.63	-0.11	18.91
97.0	22177	311	14930	552.0	7.4	617.0	7.65	-0.10	19.26
98.0	22732	318	15557	559.6	7.3	636.4	7.66	-0.10	19.61
99.0	23296	325	16203	567.3	7.2	656.2	7.68	-0.07	19.97
100.0	23867	333	16869	575.0	7.1	676.3	7.70	-0.06	20.31
101.0	24446	340	17556	582.7	7.1	696.8	7.72	-0.04	20.65
102.0	25032	347	18263	590.4	7.0	717.6	7.76	-0.04	21.02
103.0	25627	354	18991	598.2	7.0	738.8	7.78	-0.04	21.38
104.0	26229	361	19741	606.0	7.0	760.4	7.78	-0.05	21.75
105.0	26839	368	20512	613.8	6.9	782.4	7.78	-0.06	22.14
106.0	27456	375	21306	621.5	6.8	804.7	7.77	-0.08	22.53
107.0	28082	381	22122	629.3	6.7	827.4	7.73	-0.09	22.94
108.0	28715	388	22961	637.0	6.6	850.6	7.67	-0.12	23.35
109.0	29355	395	23823	644.6	6.5	874.1	7.61	-0.15	23.76
110.0	30004	401	24709	652.2	6.3	898.1	7.57	-0.17	24.19
111.0	30660	407	25620	659.8	6.2	922.5	7.55	-0.18	24.62
112.0	31323	413	26554	667.3	6.0	947.3	7.54	-0.19	25.04
113.0	31994	419	27514	674.8	5.8	972.6	7.54	-0.18	25.43
114.0	32673	425	28500	682.4	5.6	998.2	7.58	-0.16	25.81
115.0	33359	431	29511	690.0	5.5	1024.2	7.65	-0.13	26.17
116.0	34053	436	30548	697.7	5.4	1050.5	7.73	-0.10	26.53
117.0	34755	441	31612	705.5	5.3	1077.2	7.82	-0.09	26.88
118.0	35464	447	32703	713.4	5.3	1104.3	7.91	-0.08	27.24
119.0	36182	452	33821	721.3	5.2	1131.7	8.01	-0.08	27.62
120.0	36907	457	34966	729.4	5.2	1159.5	8.11	-0.08	28.03
121.0	37640	462	36140	737.5	5.2	1187.7	8.21	-0.07	28.44
122.0	38382	467	37342	745.8	5.2	1216.4	8.31	-0.07	28.84
123.0	39133	473	38573	754.1	5.2	1245.4	8.39	-0.07	29.25
124.0	39891	478	39833	762.6	5.2	1274.9	8.46	-0.06	29.66
125.0	40659	483	41123	771.1	5.1	1304.7	8.54	-0.06	30.07
S-IC INBOARD ENGINE CUTOFF									
125.880	41341	488	42284	778.6	5.1	1331.4	8.61	-0.06	30.42
126.0	41434	488	42444	779.6	5.1	1335.0	8.61	-0.06	30.41
127.0	42216	493	43792	785.9	5.0	1361.8	4.71	-0.06	24.60
128.0	43005	498	45167	790.6	4.9	1386.6	4.74	-0.06	24.94
129.0	43798	503	46567	795.4	4.8	1411.7	4.76	-0.05	25.27
130.0	44595	508	47990	800.1	4.8	1437.1	4.79	-0.05	25.60
131.0	45398	513	49441	804.9	4.7	1462.9	4.83	-0.05	25.93

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
132.0	46205	517	50917	809.8	4.7	1489.0	4.87	-0.05	26.27
133.0	47017	522	52419	814.7	4.7	1515.4	4.91	-0.05	26.60
134.0	47834	527	53948	819.6	4.4	1542.2	4.94	-0.04	26.93
135.0	48657	531	55504	824.5	4.6	1569.3	4.98	0.02	27.30
136.0	49483	536	57087	829.5	4.6	1596.9	5.01	0.03	27.70
137.0	50315	540	58698	834.4	4.6	1624.8	5.05	0.03	28.07
138.0	51152	545	60337	839.5	4.7	1653.0	5.10	0.03	28.44
139.0	51994	550	62004	844.6	4.7	1681.7	5.14	0.00	28.83
140.0	52841	554	63700	849.8	4.7	1710.7	5.19	-0.03	29.21
141.0	53694	559	65425	855.0	4.7	1740.1	5.24	-0.04	29.61
142.0	54552	564	67180	860.3	4.6	1769.9	5.28	-0.04	30.03
143.0	55414	568	68965	865.6	4.6	1800.1	5.34	-0.03	30.44
144.0	56283	573	70781	870.9	4.5	1830.8	5.40	-0.00	30.86
145.0	57156	577	72627	876.4	4.6	1861.9	5.50	0.01	31.27
146.0	58036	582	74505	881.9	4.6	1893.3	5.60	0.01	31.69
147.0	58920	586	76415	887.6	4.6	1925.2	5.70	0.02	32.11
148.0	59811	591	78355	893.3	4.6	1957.6	5.79	0.02	32.53
149.0	60707	596	80330	899.2	4.7	1990.3	6.00	0.03	32.94
150.0	61609	601	82337	905.3	4.8	2023.4	6.22	0.03	33.36
151.0	62517	605	84378	911.6	4.8	2057.0	6.42	0.04	33.78
152.0	63437	610	86463	918.1	4.9	2091.0	6.63	0.05	34.20
153.0	64359	615	88572	924.8	4.9	2125.4	6.84	0.06	34.62
S-IC OUTBOARD ENGINE CUTOFF									
153.820	65118	619	90326	930.5	4.9	2153.9	7.01	0.09	34.95
154.0	65285	620	90712	931.2	5.0	2159.2	1.36	0.09	24.20
S-IC/S-II SEPARATION COMMAND									
154.470	65718	622	91721	929.0	5.0	2164.3	-9.04	0.10	0.57
156.0	67125	630	95025	915.2	5.2	2165.2	-9.04	0.11	0.57
158.0	68936	641	99353	898.4	5.5	2168.6	-6.95	0.12	3.89
160.0	70722	652	103705	884.9	5.6	2178.9	-6.50	0.13	5.88
162.0	72477	663	108073	872.4	5.9	2191.3	-6.10	0.14	6.60
164.0	74210	676	112469	860.4	6.2	2204.6	-6.00	0.15	6.70
166.0	75919	688	116892	848.4	6.5	2218.3	-5.88	0.15	6.91
168.0	77604	702	121343	836.7	6.9	2232.2	-5.83	0.16	7.00
170.0	79266	716	125821	825.0	7.2	2246.2	-5.84	0.17	6.99
172.0	80904	730	130328	813.4	7.5	2260.2	-5.81	0.17	7.02
174.0	82519	746	134862	801.8	7.9	2274.3	-5.78	0.17	7.06
176.0	84111	762	139425	790.2	8.2	2288.4	-5.76	0.17	7.10
178.0	85680	779	144016	778.8	8.5	2302.7	-5.73	0.18	7.13

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
180.0	87226	796	148635	767.3	8.9	2317.0	-5.71	0.17	7.15
182.0	88750	814	153284	755.9	9.2	2331.3	-5.68	0.17	7.17
184.0	90250	833	157961	744.6	9.6	2345.7	-5.66	0.19	7.22
186.0	91728	853	162666	733.3	10.0	2360.1	-5.63	0.18	7.27
188.0	93183	873	167401	722.1	10.3	2374.8	-5.60	0.19	7.33
190.0	94616	894	172165	710.9	10.7	2389.4	-5.55	0.18	7.37
192.0	96027	916	176959	699.9	11.1	2404.2	-5.48	0.19	7.39
194.0	97416	938	181782	689.0	11.5	2419.0	-5.44	0.19	7.41
196.0	98783	961	186635	678.0	11.8	2433.9	-5.49	0.18	7.46
198.0	100128	985	191518	667.0	12.2	2448.8	-5.53	0.18	7.50
200.0	101451	1010	196431	656.0	12.6	2463.9	-5.52	0.19	7.53
202.0	102752	1036	201373	645.0	12.9	2479.0	-5.47	0.19	7.57
204.0	104031	1062	206347	634.0	13.3	2494.2	-5.46	0.18	7.62
206.0	105288	1089	211350	623.1	13.7	2509.5	-5.47	0.18	7.65
208.0	106523	1117	216384	612.2	14.0	2524.8	-5.47	0.18	7.68
210.0	107737	1145	221449	601.2	14.4	2540.2	-5.46	0.20	7.71
212.0	108928	1174	226545	590.3	14.8	2555.6	-5.45	0.20	7.75
214.0	110098	1204	231672	579.4	15.2	2571.2	-5.46	0.20	7.79
216.0	111246	1235	236830	568.5	15.6	2586.8	-5.45	0.20	7.82
218.0	112372	1267	242019	557.6	16.0	2602.5	-5.46	0.20	7.86
220.0	113476	1299	247240	546.7	16.4	2618.2	-5.44	0.19	7.90
222.0	114559	1333	252492	535.8	16.8	2634.1	-5.43	0.20	7.94
224.0	115619	1367	257776	524.9	17.2	2650.0	-5.43	0.21	7.99
226.0	116659	1401	263092	514.1	17.7	2666.0	-5.44	0.22	8.02
228.0	117676	1437	268440	503.2	18.1	2682.1	-5.44	0.21	8.06
230.0	118671	1474	273820	492.3	18.5	2698.2	-5.43	0.20	8.09
232.0	119645	1511	279233	481.5	18.9	2714.4	-5.42	0.21	8.14
234.0	120597	1549	284678	470.6	19.3	2730.8	-5.43	0.22	8.19
236.0	121528	1588	290156	459.8	19.8	2747.2	-5.42	0.22	8.23
238.0	122436	1628	295667	448.9	20.2	2763.6	-5.42	0.21	8.25
240.0	123323	1669	301211	438.1	20.6	2780.2	-5.42	0.22	8.29
242.0	124189	1711	306788	427.3	21.1	2796.8	-5.42	0.22	8.35
244.0	125032	1754	312398	416.4	21.5	2813.6	-5.42	0.22	8.40
246.0	125854	1797	318042	405.6	22.0	2830.4	-5.41	0.23	8.43
248.0	126655	1841	323720	394.8	22.4	2847.3	-5.41	0.23	8.48
250.0	127434	1887	329432	383.9	22.9	2864.3	-5.41	0.24	8.52
252.0	128191	1933	335177	373.1	23.4	2881.4	-5.41	0.24	8.57
254.0	128926	1980	340957	362.3	23.8	2898.6	-5.42	0.24	8.60
256.0	129640	2028	346772	351.4	24.3	2915.8	-5.42	0.25	8.65
258.0	130332	2078	352621	340.6	24.8	2933.2	-5.42	0.24	8.71
260.0	131002	2128	358504	329.8	25.3	2950.6	-5.41	0.24	8.74
262.0	131651	2179	364423	319.0	25.8	2968.2	-5.40	0.24	8.79
264.0	132278	2231	370377	308.1	26.3	2985.8	-5.41	0.25	8.85

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
266.0	132883	2284	376367	297.3	26.8	3003.5	-5.42	0.25	8.89
268.0	133467	2338	382392	286.5	27.3	3021.4	-5.43	0.26	8.93
270.0	134029	2393	388452	275.6	27.8	3039.3	-5.43	0.26	8.98
272.0	134570	2449	394549	264.8	28.3	3057.3	-5.43	0.26	9.05
274.0	135088	2506	400681	253.9	28.9	3075.5	-5.43	0.27	9.10
276.0	135585	2565	406851	243.0	29.4	3093.7	-5.43	0.27	9.14
278.0	136060	2624	413056	232.2	30.0	3112.0	-5.43	0.27	9.21
280.0	136514	2685	419299	221.3	30.5	3130.5	-5.43	0.27	9.26
282.0	136946	2746	425578	210.4	31.0	3149.1	-5.43	0.28	9.30
284.0	137356	2809	431895	199.6	31.6	3167.7	-5.44	0.28	9.34
286.0	137744	2872	438249	188.7	32.2	3186.4	-5.44	0.29	9.39
288.0	138110	2937	444641	177.8	32.8	3205.3	-5.46	0.29	9.46
290.0	138455	3003	451070	166.8	33.3	3224.2	-5.46	0.29	9.50
292.0	138778	3071	457538	155.9	33.9	3243.3	-5.48	0.28	9.56
294.0	139079	3139	464044	144.9	34.5	3262.5	-5.47	0.29	9.62
296.0	139357	3209	470588	134.0	35.1	3281.7	-5.47	0.30	9.67
298.0	139615	3279	477171	123.1	35.7	3301.1	-5.46	0.30	9.73
300.0	139850	3351	483793	112.1	36.3	3320.7	-5.48	0.30	9.79
302.0	140063	3424	490453	101.2	36.9	3340.3	-5.49	0.30	9.84
304.0	140254	3499	497154	90.2	37.5	3360.0	-5.50	0.32	9.90
306.0	140424	3574	503894	79.2	38.1	3379.9	-5.51	0.32	9.97
308.0	140571	3651	510674	68.2	38.8	3399.9	-5.50	0.33	10.03
310.0	140696	3730	517493	57.1	39.5	3420.0	-5.52	0.32	10.08
312.0	140800	3809	524354	46.1	40.1	3440.3	-5.53	0.32	10.14
314.0	140881	3890	531255	35.0	40.8	3460.6	-5.54	0.32	10.19
316.0	140940	3972	538196	23.9	41.4	3481.0	-5.56	0.33	10.26
318.0	140976	4056	545179	12.8	42.1	3501.6	-5.56	0.33	10.32
320.0	140991	4141	552203	1.7	42.8	3522.3	-5.56	0.35	10.39
322.0	140983	4227	559268	-9.4	43.4	3543.2	-5.57	0.35	10.45
324.0	140953	4314	566375	-20.6	44.1	3564.1	-5.59	0.35	10.52
326.0	140901	4403	573525	-31.8	44.8	3585.2	-5.60	0.36	10.59
328.0	140826	4494	580716	-43.0	45.6	3606.5	-5.61	0.35	10.64
330.0	140729	4586	587951	-54.2	46.3	3627.8	-5.61	0.35	10.70
332.0	140609	4679	595228	-65.5	47.0	3649.3	-5.63	0.36	10.78
334.0	140467	4773	602548	-76.7	47.7	3671.0	-5.63	0.37	10.86
336.0	140302	4870	609912	-88.0	48.4	3692.7	-5.65	0.38	10.93
338.0	140115	4967	617319	-99.3	49.2	3714.7	-5.67	0.37	10.99
340.0	139905	5066	624770	-110.7	49.9	3736.7	-5.68	0.37	11.06
342.0	139672	5167	632266	-122.1	50.7	3758.9	-5.70	0.38	11.13
344.0	139417	5269	639806	-133.5	51.5	3781.2	-5.70	0.39	11.21
346.0	139138	5373	647391	-144.9	52.3	3803.7	-5.71	0.40	11.28
348.0	138837	5478	655021	-156.3	53.1	3826.4	-5.73	0.40	11.36
350.0	138513	5585	662697	-167.8	53.9	3849.1	-5.75	0.41	11.43

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
352.0	138166	5694	670418	-179.3	54.7	3872.1	-5.77	0.41	11.49
354.0	137796	5804	678185	-190.9	55.5	3895.1	-5.79	0.41	11.57
356.0	137402	5916	685998	-202.5	56.4	3918.4	-5.80	0.42	11.65
358.0	136986	6029	693858	-214.1	57.2	3941.7	-5.81	0.42	11.74
360.0	136546	6145	701766	-225.7	58.1	3965.3	-5.83	0.43	11.81
362.0	136083	6262	709720	-237.4	58.9	3989.0	-5.85	0.43	11.87
364.0	135596	6380	717722	-249.1	59.8	4012.8	-5.87	0.44	11.96
366.0	135086	6501	725771	-260.9	60.7	4036.8	-5.88	0.45	12.05
368.0	134553	6623	733869	-272.6	61.6	4061.0	-5.89	0.44	12.12
370.0	133996	6747	742015	-284.4	62.5	4085.3	-5.92	0.45	12.20
372.0	133415	6873	750210	-296.3	63.4	4109.8	-5.94	0.46	12.28
374.0	132811	7001	758455	-308.2	64.3	4134.4	-5.96	0.46	12.36
376.0	132182	7130	766748	-320.1	65.2	4159.3	-5.97	0.47	12.47
378.0	131530	7261	775092	-332.1	66.1	4184.3	-6.00	0.46	12.56
380.0	130854	7395	783485	-344.1	67.0	4209.5	-6.03	0.45	12.66
382.0	130154	7530	791930	-356.2	68.0	4234.9	-6.05	0.46	12.75
384.0	129429	7666	800425	-368.3	68.9	4260.5	-6.06	0.47	12.82
386.0	128680	7805	808972	-380.4	69.8	4286.2	-6.08	0.47	12.91
388.0	127907	7946	817570	-392.6	70.8	4312.1	-6.11	0.48	13.01
390.0	127110	8088	826221	-404.9	71.7	4338.2	-6.13	0.48	13.10
392.0	126288	8233	834923	-417.1	72.7	4364.5	-6.16	0.49	13.20
394.0	125441	8379	843679	-429.5	73.7	4391.0	-6.18	0.50	13.30
396.0	124570	8527	852488	-441.9	74.7	4417.8	-6.21	0.52	13.42
398.0	123674	8678	861350	-454.3	75.7	4444.7	-6.23	0.51	13.53
400.0	122753	8830	870267	-466.8	76.8	4471.8	-6.26	0.52	13.61
402.0	121806	8985	879238	-479.4	77.8	4499.2	-6.29	0.51	13.70
404.0	120835	9141	888263	-492.0	78.8	4526.7	-6.31	0.52	13.80
406.0	119839	9300	897344	-504.6	79.9	4554.4	-6.34	0.54	13.92
408.0	118817	9461	906481	-517.3	81.0	4582.3	-6.37	0.54	14.03
410.0	117769	9624	915674	-530.1	82.0	4610.5	-6.39	0.55	14.14
412.0	116696	9789	924923	-542.9	83.1	4638.9	-6.43	0.55	14.24
414.0	115598	9957	934230	-555.8	84.2	4667.5	-6.47	0.55	14.35
416.0	114473	10126	943593	-568.7	85.3	4696.3	-6.50	0.56	14.46
418.0	113323	10298	953015	-581.8	86.5	4725.3	-6.52	0.57	14.60
420.0	112146	10472	962495	-594.8	87.6	4754.6	-6.55	0.58	14.71
422.0	110943	10648	972034	-608.0	88.8	4784.2	-6.57	0.57	14.83
424.0	109714	10827	981632	-621.2	89.9	4814.0	-6.61	0.59	14.94
426.0	108459	11008	991290	-634.4	91.1	4844.0	-6.64	0.61	15.07
428.0	107176	11192	1001008	-647.7	92.4	4874.3	-6.68	0.62	15.21
430.0	105868	11378	1010787	-661.1	93.6	4904.8	-6.73	0.62	15.35
432.0	104532	11566	1020627	-674.6	94.8	4935.6	-6.76	0.62	15.47
434.0	103169	11757	1030529	-688.2	96.1	4966.5	-6.79	0.61	15.59
436.0	101779	11950	1040494	-701.8	97.3	4997.8	-6.83	0.61	15.72

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
438.0	100362	12146	1050522	-715.5	98.6	5029.4	-6.86	0.61	15.85
440.0	98917	12344	1060612	-729.3	99.8	5061.2	-6.90	0.60	15.98
442.0	97445	12545	1070767	-743.1	101.0	5093.3	-6.93	0.60	16.11
444.0	95945	12749	1080986	-757.0	102.3	5125.7	-6.97	0.60	16.24
446.0	94417	12955	1091270	-771.0	103.7	5158.0	-7.16	0.60	15.09
448.0	92860	13163	1101613	-785.7	104.9	5184.7	-7.44	0.60	12.62
450.0	91274	13374	1112008	-800.7	106.1	5209.9	-7.52	0.59	12.63
452.0	89657	13588	1122453	-815.8	107.4	5235.2	-7.60	0.59	12.65
454.0	88010	13804	1132949	-831.1	108.5	5260.5	-7.69	0.59	12.67
456.0	86333	14022	1143496	-846.5	109.7	5286.1	-7.74	0.59	12.72
458.0	84624	14242	1154094	-862.0	110.9	5311.7	-7.77	0.60	12.81
460.0	82885	14465	1164743	-877.6	112.1	5337.4	-7.79	0.62	12.89
462.0	81114	14691	1175443	-893.2	113.3	5363.2	-7.83	0.63	12.95
464.0	79312	14919	1186196	-908.9	114.6	5389.2	-7.86	0.64	13.01
466.0	77479	15149	1197000	-924.6	115.9	5415.3	-7.91	0.65	13.12
468.0	75614	15382	1207857	-940.5	117.2	5441.6	-7.96	0.66	13.22
470.0	73717	15618	1218767	-956.5	118.5	5468.2	-7.99	0.66	13.31
472.0	71788	15856	1229730	-972.5	119.8	5494.8	-8.04	0.67	13.39
474.0	69827	16097	1240746	-988.6	121.2	5521.7	-8.06	0.67	13.46
476.0	67833	16341	1251817	-1004.8	122.5	5548.7	-8.11	0.68	13.54
478.0	65807	16587	1262941	-1021.0	123.9	5575.9	-8.14	0.71	13.64
480.0	63749	16837	1274120	-1037.3	125.4	5603.3	-8.18	0.73	13.75
482.0	61658	17089	1285354	-1053.7	126.8	5630.8	-8.21	0.75	13.81
484.0	59534	17344	1296644	-1070.2	128.3	5658.5	-8.27	0.73	13.87
486.0	57377	17602	1307989	-1086.8	129.8	5686.3	-8.32	0.74	13.94
488.0	55187	17863	1319389	-1103.5	131.3	5714.3	-8.38	0.74	14.04
490.0	52963	18127	1330846	-1120.3	132.7	5742.5	-8.43	0.74	14.14
492.0	50705	18394	1342359	-1137.2	134.2	5770.9	-8.48	0.75	14.23
494.0	48414	18664	1353930	-1154.2	135.7	5799.5	-8.54	0.76	14.35
496.0	46088	18937	1365557	-1171.4	137.3	5828.3	-8.60	0.77	14.53
498.0	43728	19213	1377243	-1188.7	138.8	5857.6	-8.68	0.78	14.68
500.0	41334	19492	1388988	-1206.1	140.4	5887.0	-8.72	0.81	14.74
502.0	38904	19775	1400791	-1223.5	142.0	5916.4	-8.71	0.82	14.73
504.0	36440	20061	1412653	-1241.0	143.7	5946.0	-8.73	0.82	14.78
506.0	33940	20350	1424575	-1258.5	145.3	5975.7	-8.80	0.80	14.94
508.0	31406	20642	1436556	-1276.2	146.9	6005.7	-8.89	0.80	15.12
510.0	28835	20937	1448598	-1294.0	148.5	6036.1	-8.97	0.82	15.26
512.0	26229	21236	1460701	-1312.0	150.2	6066.7	-8.99	0.84	15.37
514.0	23587	21538	1472865	-1330.0	151.9	6097.5	-9.03	0.85	15.49
516.0	20909	21843	1485092	-1348.1	153.6	6128.6	-9.06	0.86	15.63
518.0	18195	22152	1497380	-1366.2	155.3	6160.0	-9.06	0.86	15.76
520.0	15444	22464	1509732	-1384.4	157.0	6191.6	-9.07	0.87	15.90
522.0	12656	22781	1522154	-1402.5	158.8	6223.6	-9.07	0.87	16.04

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
524.0	9833	23099	1534633	-1420.6	160.4	6255.8	-9.07	0.63	16.18
S-II ENGINE CUTOFF									
524.040	9776	23106	1534883	-1421.0	160.4	6256.4	-9.07	0.62	16.18
S-II/S-IVB SEPARATION COMMAND									
524.900	8551	23244	1540262	-1428.3	160.9	6258.7	-8.25	0.55	-1.89
526.0	6975	23421	1547138	-1437.3	161.5	6256.6	-8.25	0.55	-1.89
528.0	4084	23745	1559648	-1453.8	162.5	6252.9	-8.26	0.55	-1.51
530.0	1160	24072	1572153	-1470.4	163.5	6252.0	-8.28	0.56	1.90
532.0	-1798	24399	1584663	-1487.0	164.7	6257.6	-8.33	0.57	3.14
534.0	-4789	24730	1597184	-1503.7	165.8	6264.2	-8.40	0.57	3.41
536.0	-7814	25063	1609720	-1520.8	167.0	6271.2	-8.56	0.58	3.50
538.0	-10872	25398	1622270	-1538.1	168.1	6278.1	-8.76	0.59	3.47
540.0	-13966	25735	1634833	-1555.9	169.3	6285.1	-8.99	0.58	3.52
542.0	-17096	26075	1647410	-1574.0	170.5	6292.2	-9.17	0.59	3.52
544.0	-20263	26417	1660002	-1592.5	171.7	6299.2	-9.28	0.60	3.50
546.0	-23466	26762	1672607	-1611.1	172.9	6306.2	-9.31	0.61	3.48
548.0	-26707	27109	1685226	-1629.7	174.1	6313.1	-9.28	0.60	3.48
550.0	-29985	27458	1697860	-1648.3	175.2	6320.1	-9.25	0.58	3.50
552.0	-33300	27810	1710507	-1666.8	176.4	6327.1	-9.26	0.59	3.49
554.0	-36652	28164	1723168	-1685.3	177.6	6334.0	-9.29	0.61	3.45
556.0	-40041	28520	1735843	-1703.9	178.8	6340.9	-9.32	0.62	3.44
558.0	-43468	28879	1748532	-1722.6	180.1	6347.8	-9.32	0.63	3.42
560.0	-46932	29240	1761234	-1741.2	181.3	6354.6	-9.32	0.62	3.41
562.0	-50433	29604	1773950	-1759.9	182.6	6361.4	-9.33	0.63	3.40
564.0	-53971	29971	1786680	-1778.5	183.8	6368.2	-9.33	0.62	3.40
566.0	-57547	30340	1799423	-1797.2	185.1	6375.0	-9.34	0.64	3.41
568.0	-61160	30711	1812180	-1815.8	186.4	6381.9	-9.32	0.64	3.42
570.0	-64810	31085	1824950	-1834.5	187.7	6388.7	-9.31	0.64	3.42
572.0	-68498	31462	1837735	-1853.1	189.0	6395.6	-9.32	0.65	3.42
574.0	-72222	31841	1850533	-1871.7	190.3	6402.4	-9.33	0.65	3.42
576.0	-75985	32223	1863344	-1890.4	191.5	6409.2	-9.33	0.65	3.42
578.0	-79784	32607	1876170	-1909.1	192.9	6416.1	-9.33	0.65	3.42
580.0	-83621	32994	1889008	-1927.8	194.2	6422.9	-9.34	0.66	3.42
582.0	-87495	33384	1901861	-1946.4	195.5	6429.7	-9.36	0.65	3.41
584.0	-91407	33776	1914727	-1965.2	196.8	6436.5	-9.36	0.65	3.40
586.0	-95356	34171	1927607	-1983.9	198.1	6443.3	-9.35	0.66	3.39
588.0	-99342	34569	1940501	-2002.6	199.4	6450.1	-9.33	0.67	3.40
590.0	-103366	34969	1953408	-2021.2	200.7	6457.0	-9.33	0.67	3.42
592.0	-107427	35372	1966329	-2039.9	202.1	6463.8	-9.34	0.66	3.44

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
594.0	-111525	35777	1979263	-2058.6	203.4	6470.7	-9.36	0.66	3.45
596.0	-115661	36185	1992212	-2077.3	204.7	6477.6	-9.36	0.66	3.46
598.0	-119835	36596	2005174	-2096.0	206.0	6484.5	-9.36	0.66	3.45
600.0	-124045	37009	2018150	-2114.8	207.4	6491.4	-9.37	0.67	3.45
602.0	-128294	37425	2031140	-2133.5	208.7	6498.3	-9.39	0.67	3.45
604.0	-132579	37844	2044143	-2152.3	210.1	6505.2	-9.39	0.67	3.44
606.0	-136903	38266	2057160	-2171.1	211.4	6512.1	-9.37	0.67	3.44
608.0	-141264	38690	2070192	-2189.8	212.7	6519.0	-9.37	0.67	3.43
610.0	-145662	39117	2083236	-2208.5	214.1	6525.8	-9.36	0.65	3.42
612.0	-150098	39546	2096295	-2227.2	215.4	6532.7	-9.35	0.67	3.41
614.0	-154571	39978	2109367	-2245.9	216.7	6539.5	-9.33	0.67	3.41
616.0	-159081	40413	2122453	-2264.6	218.1	6546.3	-9.33	0.66	3.42
618.0	-163629	40850	2135552	-2283.2	219.4	6553.2	-9.33	0.67	3.42
620.0	-168214	41291	2148665	-2301.9	220.7	6560.0	-9.30	0.67	3.42
622.0	-172837	41733	2161792	-2320.5	222.1	6566.8	-9.29	0.68	3.42
624.0	-177496	42179	2174933	-2339.1	223.4	6573.7	-9.30	0.68	3.43
626.0	-182193	42627	2188087	-2357.7	224.8	6580.6	-9.31	0.67	3.44
628.0	-186927	43078	2201255	-2376.3	226.1	6587.4	-9.30	0.67	3.42
630.0	-191698	43532	2214437	-2394.9	227.5	6594.3	-9.28	0.68	3.43
632.0	-196506	43988	2227632	-2413.5	228.9	6601.2	-9.29	0.68	3.44
634.0	-201352	44447	2240841	-2432.1	230.2	6608.1	-9.32	0.68	3.47
636.0	-206235	44909	2254065	-2450.7	231.6	6615.0	-9.32	0.69	3.49
638.0	-211155	45374	2267302	-2469.3	233.0	6622.0	-9.32	0.68	3.49
640.0	-216112	45841	2280553	-2488.0	234.3	6629.0	-9.33	0.69	3.51
642.0	-221107	46311	2293818	-2506.6	235.7	6636.0	-9.33	0.68	3.51
644.0	-226139	46784	2307097	-2525.3	237.1	6643.1	-9.33	0.68	3.49
646.0	-231208	47259	2320390	-2544.0	238.4	6650.0	-9.32	0.69	3.47
648.0	-236314	47737	2333697	-2562.6	239.8	6656.9	-9.32	0.68	3.46
650.0	-241458	48218	2347017	-2581.2	241.2	6663.8	-9.32	0.68	3.47
652.0	-246639	48702	2360352	-2599.9	242.5	6670.8	-9.30	0.68	3.48
654.0	-251858	49188	2373701	-2618.4	243.9	6677.8	-9.25	0.69	3.51
656.0	-257113	49678	2387063	-2636.8	245.3	6684.9	-9.18	0.70	3.55
658.0	-262405	50170	2400440	-2655.1	246.7	6692.0	-9.13	0.70	3.58
660.0	-267733	50664	2413831	-2673.4	248.1	6699.1	-9.13	0.71	3.58
662.0	-273098	51162	2427237	-2691.7	249.5	6706.3	-9.14	0.70	3.57
664.0	-278500	51662	2440656	-2710.0	250.9	6713.4	-9.15	0.70	3.57
666.0	-283938	52166	2454090	-2728.3	252.3	6720.6	-9.14	0.70	3.57
668.0	-289413	52672	2467539	-2746.5	253.7	6727.7	-9.13	0.70	3.59
670.0	-294924	53180	2481001	-2764.8	255.1	6734.9	-9.13	0.70	3.61
672.0	-300472	53692	2494479	-2783.1	256.5	6742.2	-9.14	0.70	3.62
674.0	-306057	54206	2507970	-2801.4	257.9	6749.4	-9.14	0.70	3.61
676.0	-311678	54724	2521476	-2819.6	259.3	6756.6	-9.14	0.70	3.60
678.0	-317335	55244	2534997	-2837.9	260.7	6763.8	-9.14	0.70	3.60

TABLE B-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
680.0	-323029	55767	2548531	-2856.2	262.2	6771.0	-9.14	0.70	3.60
682.0	-328760	56292	2562081	-2874.5	263.6	6778.2	-9.14	0.70	3.60
684.0	-334527	56821	2575644	-2892.7	265.1	6785.4	-9.14	0.70	3.60
S-IVB FIRST GUIDANCE CUTOFF									
684.980	-337367	57081	2582295	-2901.7	265.7	6788.9	-9.14	0.67	3.60
686.0	-340330	57352	2589218	-2909.9	266.3	6787.3	-7.66	0.59	-3.35
688.0	-346165	57886	2602784	-2925.2	267.4	6780.6	-7.65	0.50	-3.36
690.0	-352030	58422	2616338	-2940.5	268.3	6773.9	-7.64	0.50	-3.37
692.0	-357926	58960	2629879	-2955.8	269.4	6767.1	-7.63	0.50	-3.37
694.0	-363853	59500	2643407	-2971.0	270.4	6760.4	-7.62	0.50	-3.38
PARKING ORBIT INSERTION									
694.980	-366772	59764	2650029	-2978.3	270.9	6757.0	-7.61	0.51	-3.38

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
GUIDANCE REFERENCE RELEASE									
-16.970	-2153.766	5173.409	3035.916	-377.3	-157.1	0.0	0.01	-0.03	0.0
-16.0	-2154.132	5173.257	3035.916	-377.2	-157.1	0.0	0.01	-0.03	0.0
-15.0	-2154.509	5173.099	3035.916	-377.2	-157.1	0.0	0.01	-0.03	0.0
-14.0	-2154.886	5172.942	3035.916	-377.2	-157.1	0.0	0.01	-0.03	0.0
-13.0	-2155.263	5172.785	3035.916	-377.2	-157.2	0.0	0.01	-0.03	0.0
-12.0	-2155.641	5172.628	3035.916	-377.2	-157.2	0.0	0.01	-0.03	0.0
-11.0	-2156.018	5172.471	3035.916	-377.2	-157.2	0.0	0.01	-0.03	0.0
-10.0	-2156.395	5172.314	3035.916	-377.2	-157.2	0.0	0.01	-0.03	0.0
-9.0	-2156.772	5172.156	3035.916	-377.2	-157.3	0.0	0.01	-0.03	0.0
-8.0	-2157.149	5171.999	3035.916	-377.1	-157.3	0.0	0.01	-0.03	0.0
-7.0	-2157.526	5171.842	3035.916	-377.1	-157.3	0.0	0.01	-0.03	0.0
-6.0	-2157.903	5171.684	3035.916	-377.1	-157.4	0.0	0.01	-0.03	0.0
-5.0	-2158.281	5171.527	3035.916	-377.1	-157.4	0.0	0.01	-0.03	0.0
-4.0	-2158.658	5171.370	3035.916	-377.1	-157.4	0.0	0.01	-0.03	0.0
-3.0	-2159.035	5171.212	3035.916	-377.1	-157.4	0.0	0.01	-0.03	0.0
-2.0	-2159.412	5171.055	3035.916	-377.1	-157.5	0.0	0.01	-0.03	0.0
-1.0	-2159.789	5170.897	3035.916	-377.1	-157.5	0.0	0.01	-0.03	0.0
-0.0	-2160.166	5170.740	3035.916	-377.1	-157.5	0.0	0.01	-0.03	0.0
FIRST MOTION									
0.330	-2160.290	5170.688	3035.916	-377.1	-157.5	0.0	-0.53	1.28	0.79
IU UMBILICAL DISCONNECT									
0.670	-2160.419	5170.634	3035.916	-377.3	-157.0	0.3	-0.71	1.70	1.05
1.0	-2160.543	5170.583	3035.916	-377.5	-156.4	0.7	-0.83	1.99	1.24
2.0	-2160.921	5170.427	3035.918	-378.4	-154.4	2.0	-0.86	2.01	1.29
3.0	-2161.300	5170.274	3035.920	-379.3	-152.3	3.3	-0.92	2.07	1.29
4.0	-2161.680	5170.122	3035.924	-380.2	-150.2	4.5	-1.01	2.19	1.17
5.0	-2162.060	5169.973	3035.929	-381.3	-148.0	5.7	-1.05	2.27	1.17
6.0	-2162.442	5169.827	3035.936	-382.3	-145.7	6.8	-1.09	2.37	1.17
7.0	-2162.825	5169.682	3035.943	-383.4	-143.3	8.0	-1.11	2.42	1.16
8.0	-2163.209	5169.540	3035.952	-384.6	-140.8	9.2	-1.12	2.46	1.17
9.0	-2163.594	5169.400	3035.961	-385.7	-138.3	10.3	-1.14	2.52	1.20
10.0	-2163.981	5169.263	3035.972	-386.8	-135.8	11.6	-1.15	2.58	1.24
11.0	-2164.368	5169.129	3035.984	-388.0	-133.2	12.8	-1.16	2.63	1.31
12.0	-2164.756	5168.997	3035.998	-389.1	-130.5	14.2	-1.15	2.64	1.43
13.0	-2165.146	5168.868	3036.013	-390.3	-127.9	15.7	-1.17	2.62	1.54
14.0	-2165.537	5168.741	3036.029	-391.5	-125.3	17.3	-1.24	2.60	1.64

TABLE B-11 GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
15.0	-2165.929	5168.617	3036.047	-392.8	-122.7	18.9	-1.35	2.61	1.69
16.0	-2166.323	5168.496	3036.067	-394.2	-120.1	20.7	-1.45	2.62	1.74
17.0	-2166.718	5168.377	3036.089	-395.7	-117.5	22.4	-1.56	2.65	1.79
18.0	-2167.114	5168.261	3036.112	-397.3	-114.8	24.2	-1.65	2.69	1.86
19.0	-2167.512	5168.147	3036.137	-399.0	-112.1	26.2	-1.75	2.72	1.95
20.0	-2167.913	5168.037	3036.163	-400.8	-109.3	28.1	-1.85	2.74	2.05
21.0	-2168.315	5167.929	3036.192	-402.7	-106.6	30.2	-1.98	2.74	2.13
22.0	-2168.719	5167.820	3036.220	-404.7	-103.9	32.4	-2.10	2.74	2.20
23.0	-2169.125	5167.715	3036.253	-406.9	-101.1	34.6	-2.23	2.73	2.27
24.0	-2169.533	5167.615	3036.289	-409.2	-98.4	36.9	-2.36	2.73	2.33
25.0	-2169.944	5167.518	3036.327	-411.6	-95.7	39.3	-2.49	2.72	2.40
26.0	-2170.357	5167.424	3036.367	-414.1	-93.0	41.7	-2.63	2.69	2.48
27.0	-2170.772	5167.332	3036.410	-416.8	-90.3	44.2	-2.76	2.68	2.56
28.0	-2171.190	5167.243	3036.456	-419.7	-87.6	46.8	-2.90	2.67	2.63
29.0	-2171.612	5167.157	3036.504	-422.6	-84.9	49.5	-3.04	2.68	2.71
30.0	-2172.036	5167.073	3036.555	-425.7	-82.3	52.3	-3.17	2.68	2.79
31.0	-2172.463	5166.992	3036.608	-429.0	-79.6	55.1	-3.30	2.68	2.86
32.0	-2172.894	5166.914	3036.665	-432.3	-76.9	58.0	-3.43	2.68	2.93
33.0	-2173.328	5166.839	3036.724	-435.8	-74.2	60.9	-3.56	2.69	2.99
34.0	-2173.765	5166.766	3036.787	-439.5	-71.5	64.0	-3.68	2.69	3.05
35.0	-2174.207	5166.696	3036.852	-443.2	-68.8	67.1	-3.82	2.69	3.12
36.0	-2174.652	5166.628	3036.921	-447.1	-66.2	70.2	-3.98	2.68	3.21
37.0	-2175.101	5166.563	3036.993	-451.2	-63.5	73.5	-4.15	2.66	3.29
38.0	-2175.554	5166.501	3037.068	-455.4	-60.8	76.8	-4.32	2.63	3.37
39.0	-2176.012	5166.442	3037.146	-459.8	-58.2	80.2	-4.50	2.60	3.46
40.0	-2176.474	5166.385	3037.228	-464.4	-55.6	83.7	-4.69	2.57	3.54
41.0	-2176.941	5166.330	3037.314	-469.2	-53.1	87.3	-4.88	2.53	3.62
42.0	-2177.413	5166.278	3037.403	-474.2	-50.6	91.0	-5.06	2.50	3.70
43.0	-2177.889	5166.229	3037.496	-479.3	-48.1	94.7	-5.23	2.46	3.78
44.0	-2178.371	5166.182	3037.592	-484.6	-45.6	98.5	-5.41	2.44	3.85
45.0	-2178.859	5166.138	3037.693	-490.1	-43.2	102.4	-5.59	2.42	3.92
46.0	-2179.352	5166.096	3037.797	-495.8	-40.8	106.4	-5.79	2.40	3.99
47.0	-2179.850	5166.056	3037.906	-501.7	-38.4	110.4	-5.99	2.37	4.06
48.0	-2180.355	5166.019	3038.018	-507.8	-36.1	114.5	-6.19	2.34	4.12
49.0	-2180.866	5165.984	3038.135	-514.1	-33.7	118.6	-6.39	2.31	4.19
50.0	-2181.383	5165.951	3038.255	-520.6	-31.5	122.8	-6.59	2.26	4.26
51.0	-2181.907	5165.921	3038.380	-527.3	-29.2	127.1	-6.79	2.21	4.34
52.0	-2182.438	5165.893	3038.510	-534.1	-27.0	131.5	-6.97	2.16	4.43
53.0	-2182.976	5165.867	3038.643	-541.2	-24.9	136.0	-7.15	2.10	4.54
54.0	-2183.520	5165.843	3038.782	-548.5	-22.9	140.6	-7.33	2.01	4.64
55.0	-2184.073	5165.821	3038.925	-555.9	-20.9	145.3	-7.51	1.95	4.75
56.0	-2184.632	5165.801	3039.072	-563.5	-18.9	150.1	-7.69	1.91	4.84
57.0	-2185.200	5165.783	3039.225	-571.3	-17.1	155.0	-7.89	1.86	4.93

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
58.0	-2185.775	5165.767	3039.382	-579.2	-15.2	159.9	-8.06	1.81	5.01
59.0	-2186.358	5165.753	3039.545	-587.4	-13.4	165.0	-8.22	1.76	5.07
60.0	-2186.950	5165.740	3039.712	-595.7	-11.7	170.1	-8.39	1.71	5.13
61.0	-2187.550	5165.730	3039.885	-604.2	-10.0	175.2	-8.56	1.64	5.21
MACH 1									
61.450	-2187.822	5165.725	3039.964	-608.0	-9.3	177.6	-8.62	1.61	5.24
62.0	-2188.158	5165.720	3040.063	-612.8	-8.4	180.5	-8.71	1.56	5.28
63.0	-2188.775	5165.713	3040.246	-621.6	-6.9	185.8	-8.88	1.47	5.36
64.0	-2189.401	5165.707	3040.434	-630.6	-5.5	191.2	-9.05	1.39	5.46
65.0	-2190.036	5165.702	3040.628	-639.7	-4.1	196.7	-9.23	1.31	5.55
66.0	-2190.681	5165.698	3040.828	-649.0	-2.8	202.3	-9.45	1.25	5.63
67.0	-2191.335	5165.696	3041.033	-658.6	-1.6	208.0	-9.67	1.21	5.72
68.0	-2191.998	5165.695	3041.244	-668.4	-0.4	213.7	-9.90	1.18	5.79
69.0	-2192.671	5165.695	3041.461	-678.4	0.7	219.6	-10.13	1.14	5.87
70.0	-2193.355	5165.696	3041.683	-688.6	1.9	225.5	-10.36	1.11	5.94
71.0	-2194.049	5165.699	3041.912	-699.1	3.0	231.5	-10.59	1.10	6.02
72.0	-2194.753	5165.702	3042.146	-709.8	4.1	237.6	-10.82	1.06	6.12
73.0	-2195.468	5165.707	3042.387	-720.7	5.1	243.7	-11.06	1.00	6.22
74.0	-2196.195	5165.713	3042.634	-731.9	6.1	250.0	-11.31	0.93	6.30
75.0	-2196.932	5165.719	3042.887	-743.4	6.9	256.3	-11.58	0.85	6.39
76.0	-2197.682	5165.726	3043.146	-755.1	7.7	262.7	-11.87	0.73	6.49
77.0	-2198.443	5165.734	3043.412	-767.1	8.4	269.3	-12.17	0.59	6.60
78.0	-2199.216	5165.743	3043.685	-779.4	8.9	276.0	-12.48	0.41	6.71
MAXIMUM DYNAMIC PRESSURE									
78.900	-2199.923	5165.751	3043.936	-790.8	9.2	282.0	-12.77	0.21	6.81
79.0	-2200.002	5165.752	3043.964	-792.1	9.2	282.7	-12.80	0.18	6.82
80.0	-2200.800	5165.761	3044.250	-805.0	9.2	289.6	-13.13	-0.07	6.94
81.0	-2201.612	5165.771	3044.543	-818.3	9.0	296.6	-13.46	-0.33	7.06
82.0	-2202.437	5165.779	3044.844	-832.0	8.6	303.7	-13.80	-0.62	7.18
83.0	-2203.276	5165.788	3045.151	-845.9	7.8	310.9	-14.15	-0.91	7.29
84.0	-2204.129	5165.795	3045.466	-860.3	6.8	318.3	-14.50	-1.19	7.39
85.0	-2204.996	5165.801	3045.788	-874.9	5.4	325.7	-14.84	-1.46	7.48
86.0	-2205.879	5165.806	3046.117	-889.9	3.9	333.3	-15.18	-1.70	7.58
87.0	-2206.776	5165.809	3046.454	-905.3	2.0	340.9	-15.51	-1.94	7.71
88.0	-2207.689	5165.810	3046.799	-920.9	-0.0	348.7	-15.82	-2.17	7.83
89.0	-2208.618	5165.809	3047.151	-936.9	-2.3	356.6	-16.11	-2.39	7.96
90.0	-2209.563	5165.805	3047.512	-953.2	-4.8	364.6	-16.39	-2.60	8.08
91.0	-2210.525	5165.799	3047.881	-969.7	-7.5	372.8	-16.68	-2.79	8.22
92.0	-2211.503	5165.790	3048.258	-986.5	-10.4	381.0	-16.96	-2.97	8.36

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
93.0	-2212.498	5165.778	3048.643	-1003.6	-13.4	389.5	-17.21	-3.13	8.50
94.0	-2213.510	5165.763	3049.037	-1020.9	-16.6	398.0	-17.48	-3.30	8.62
95.0	-2214.540	5165.745	3049.439	-1038.6	-20.0	406.7	-17.77	-3.46	8.73
96.0	-2215.587	5165.723	3049.850	-1056.5	-23.5	415.5	-18.05	-3.61	8.84
97.0	-2216.653	5165.698	3050.270	-1074.7	-27.2	424.4	-18.35	-3.77	8.94
98.0	-2217.737	5165.669	3050.699	-1093.2	-31.1	433.4	-18.64	-3.95	9.03
99.0	-2218.839	5165.635	3051.137	-1112.0	-35.1	442.4	-18.95	-4.10	9.12
100.0	-2219.961	5165.598	3051.584	-1131.1	-39.3	451.6	-19.24	-4.26	9.21
101.0	-2221.102	5165.557	3052.040	-1150.4	-43.6	460.9	-19.54	-4.42	9.30
102.0	-2222.262	5165.511	3052.505	-1170.1	-48.1	470.2	-19.85	-4.58	9.41
103.0	-2223.442	5165.460	3052.980	-1190.1	-52.8	479.7	-20.15	-4.76	9.52
104.0	-2224.642	5165.405	3053.465	-1210.4	-57.7	489.3	-20.45	-4.94	9.63
105.0	-2225.863	5165.345	3053.959	-1231.1	-62.7	498.9	-20.75	-5.15	9.74
106.0	-2227.104	5165.280	3054.463	-1252.0	-68.0	508.7	-21.07	-5.37	9.85
107.0	-2228.367	5165.209	3054.976	-1273.2	-73.5	518.6	-21.38	-5.62	9.96
108.0	-2229.651	5165.133	3055.500	-1294.7	-79.2	528.6	-21.67	-5.89	10.07
109.0	-2230.956	5165.050	3056.034	-1316.5	-85.3	538.8	-21.98	-6.16	10.18
110.0	-2232.284	5164.962	3056.578	-1338.7	-91.6	549.0	-22.31	-6.42	10.29
111.0	-2233.634	5164.867	3057.132	-1361.1	-98.1	559.4	-22.64	-6.66	10.40
112.0	-2235.006	5164.766	3057.696	-1384.0	-104.9	569.8	-22.98	-6.89	10.51
113.0	-2236.402	5164.657	3058.271	-1407.1	-111.9	580.4	-23.30	-7.10	10.61
114.0	-2237.821	5164.542	3058.857	-1430.5	-119.0	591.0	-23.63	-7.25	10.72
115.0	-2239.263	5164.419	3059.454	-1454.3	-126.3	601.8	-23.97	-7.38	10.82
116.0	-2240.729	5164.289	3060.061	-1478.5	-133.8	612.7	-24.29	-7.49	10.93
117.0	-2242.220	5164.152	3060.679	-1502.9	-141.3	623.7	-24.62	-7.60	11.06
118.0	-2243.736	5164.007	3061.308	-1527.7	-148.9	634.7	-24.94	-7.72	11.20
119.0	-2245.276	5163.854	3061.949	-1552.9	-156.7	646.0	-25.29	-7.84	11.34
120.0	-2246.842	5163.693	3062.600	-1578.4	-164.6	657.4	-25.66	-7.97	11.50
121.0	-2248.433	5163.525	3063.263	-1604.2	-172.6	668.9	-26.02	-8.10	11.65
122.0	-2250.050	5163.348	3063.938	-1630.5	-180.7	680.5	-26.39	-8.23	11.81
123.0	-2251.694	5163.164	3064.625	-1657.1	-189.0	692.4	-26.75	-8.38	11.95
124.0	-2253.365	5162.971	3065.323	-1684.0	-197.5	704.3	-27.11	-8.53	12.10
125.0	-2255.063	5162.769	3066.034	-1711.3	-206.1	716.5	-27.47	-8.68	12.24
S-IC INBOARD ENGINE CUTOFF									
125.880	-2256.581	5162.584	3066.670	-1735.6	-213.8	727.3	-27.78	-8.81	12.37
126.0	-2256.789	5162.558	3066.757	-1739.0	-214.8	728.8	-27.77	-8.80	12.37
127.0	-2258.539	5162.339	3067.491	-1763.0	-223.7	739.1	-21.68	-8.99	8.93
128.0	-2260.314	5162.110	3068.235	-1784.8	-232.8	748.1	-21.96	-9.15	9.03
129.0	-2262.110	5161.873	3068.988	-1806.9	-242.0	757.2	-22.24	-9.30	9.13
130.0	-2263.928	5161.626	3069.749	-1829.3	-251.4	766.4	-22.52	-9.46	9.23
131.0	-2265.768	5161.370	3070.520	-1851.9	-260.9	775.7	-22.80	-9.60	9.34

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
132.0	-2267.632	5161.104	3071.301	-1874.9	-270.6	785.1	-23.08	-9.74	9.45
133.0	-2269.518	5160.828	3072.090	-1898.1	-280.4	794.5	-23.37	-9.88	9.56
134.0	-2271.428	5160.543	3072.890	-1921.5	-290.4	804.4	-23.65	-10.02	9.65
135.0	-2273.362	5160.247	3073.699	-1945.4	-300.5	813.9	-23.99	-10.17	9.72
136.0	-2275.319	5159.942	3074.517	-1969.6	-310.8	823.7	-24.33	-10.35	9.84
137.0	-2277.301	5159.625	3075.346	-1994.1	-321.3	833.5	-24.64	-10.51	9.96
138.0	-2279.307	5159.299	3076.185	-2018.9	-331.9	843.6	-24.96	-10.68	10.08
139.0	-2281.339	5158.962	3077.033	-2044.0	-342.7	853.7	-25.28	-10.85	10.23
140.0	-2283.395	5158.613	3077.892	-2069.4	-353.6	864.0	-25.59	-11.02	10.38
141.0	-2285.478	5158.254	3078.761	-2095.2	-364.7	874.4	-25.93	-11.20	10.52
142.0	-2287.586	5157.884	3079.641	-2121.3	-376.0	885.0	-26.28	-11.38	10.65
143.0	-2289.721	5157.502	3080.531	-2147.8	-387.5	895.7	-26.64	-11.55	10.78
144.0	-2291.882	5157.109	3081.433	-2174.6	-399.1	906.6	-27.01	-11.70	10.91
145.0	-2294.070	5156.704	3082.344	-2201.8	-410.9	917.6	-27.39	-11.84	11.06
146.0	-2296.286	5156.287	3083.268	-2229.4	-422.8	928.6	-27.76	-11.98	11.21
147.0	-2298.529	5155.858	3084.202	-2257.3	-434.9	940.0	-28.14	-12.11	11.37
148.0	-2300.800	5155.418	3085.148	-2285.6	-447.0	951.4	-28.51	-12.26	11.52
149.0	-2303.101	5154.964	3086.105	-2314.4	-459.3	963.0	-28.92	-12.31	11.73
150.0	-2305.430	5154.499	3087.074	-2343.5	-471.6	974.8	-29.34	-12.35	11.94
151.0	-2307.788	5154.020	3088.055	-2373.0	-484.0	986.8	-29.75	-12.41	12.14
152.0	-2310.188	5153.528	3089.053	-2403.0	-496.5	999.0	-30.16	-12.46	12.35
153.0	-2312.606	5153.025	3090.059	-2433.4	-509.0	1011.5	-30.58	-12.51	12.56
	S-IC OUTBOARD ENGINE CUTOFF								
153.820	-2314.611	5152.603	3090.891	-2458.6	-519.2	1021.9	-30.93	-12.54	12.70
154.0	-2315.052	5152.510	3091.075	-2463.1	-521.4	1023.6	-20.19	-11.59	7.09
	S-IC/S-II SEPARATION COMMAND								
154.470	-2316.203	5152.264	3091.552	-2466.6	-526.0	1023.9	2.69	-7.89	-4.26
156.0	-2319.966	5151.452	3093.109	-2462.4	-538.0	1017.3	2.69	-7.88	-4.27
158.0	-2324.882	5150.360	3095.134	-2459.3	-553.9	1010.0	-0.74	-7.89	-2.38
160.0	-2329.809	5149.235	3097.153	-2463.0	-570.6	1006.2	-2.53	-8.54	-1.64
162.0	-2334.739	5148.077	3099.161	-2468.8	-587.6	1003.3	-3.25	-8.59	-1.26
164.0	-2339.683	5146.885	3101.165	-2475.4	-604.7	1000.9	-3.37	-8.56	-1.19
166.0	-2344.641	5145.658	3103.164	-2482.4	-621.9	998.6	-3.58	-8.57	-1.08
168.0	-2349.613	5144.397	3105.159	-2489.6	-639.1	996.4	-3.67	-8.58	-1.04
170.0	-2354.599	5143.101	3107.150	-2497.0	-656.2	994.3	-3.66	-8.57	-1.05
172.0	-2359.601	5141.772	3109.137	-2504.3	-673.4	992.3	-3.69	-8.57	-1.03
174.0	-2364.617	5140.408	3111.119	-2511.7	-690.5	990.2	-3.73	-8.57	-1.01
176.0	-2369.648	5139.010	3113.098	-2519.2	-707.7	988.2	-3.77	-8.57	-0.99
178.0	-2374.694	5137.577	3115.072	-2526.8	-724.8	986.3	-3.80	-8.57	-0.97

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
180.0	-2379.755	5136.110	3117.043	-2534.4	-741.9	984.4	-3.82	-8.56	-0.95
182.0	-2384.831	5134.609	3119.010	-2542.1	-759.0	982.5	-3.84	-8.55	-0.93
184.0	-2389.923	5133.074	3120.973	-2549.8	-776.1	980.6	-3.89	-8.56	-0.92
186.0	-2395.031	5131.505	3122.932	-2557.6	-793.2	978.8	-3.93	-8.56	-0.89
188.0	-2400.154	5129.901	3124.888	-2565.6	-810.4	977.1	-3.99	-8.57	-0.86
190.0	-2405.293	5128.263	3126.841	-2573.6	-827.5	975.4	-4.04	-8.55	-0.83
192.0	-2410.448	5126.591	3128.790	-2581.7	-844.5	973.8	-4.08	-8.50	-0.79
194.0	-2415.620	5124.885	3130.736	-2589.9	-861.5	972.2	-4.11	-8.49	-0.77
196.0	-2420.808	5123.145	3132.679	-2598.1	-878.6	970.7	-4.13	-8.55	-0.77
198.0	-2426.012	5121.371	3134.618	-2606.4	-895.7	969.1	-4.13	-8.61	-0.78
200.0	-2431.233	5119.562	3136.555	-2614.7	-913.0	967.6	-4.17	-8.62	-0.77
202.0	-2436.471	5117.719	3138.489	-2623.1	-930.2	966.1	-4.21	-8.60	-0.74
204.0	-2441.726	5115.842	3140.419	-2631.5	-947.4	964.6	-4.25	-8.62	-0.71
206.0	-2446.997	5113.929	3142.347	-2640.1	-964.7	963.2	-4.26	-8.64	-0.71
208.0	-2452.286	5111.983	3144.272	-2648.6	-982.0	961.8	-4.29	-8.66	-0.70
210.0	-2457.592	5110.002	3146.194	-2657.2	-999.3	960.4	-4.32	-8.67	-0.70
212.0	-2462.915	5107.986	3148.113	-2665.9	-1016.7	959.0	-4.35	-8.69	-0.69
214.0	-2468.255	5105.935	3150.030	-2674.6	-1034.1	957.6	-4.37	-8.71	-0.68
216.0	-2473.613	5103.849	3151.944	-2683.4	-1051.5	956.2	-4.40	-8.72	-0.67
218.0	-2478.989	5101.729	3153.855	-2692.2	-1069.0	954.9	-4.43	-8.75	-0.66
220.0	-2484.382	5099.573	3155.764	-2701.1	-1086.5	953.6	-4.46	-8.76	-0.64
222.0	-2489.793	5097.383	3157.670	-2710.0	-1104.0	952.3	-4.49	-8.77	-0.63
224.0	-2495.222	5095.157	3159.573	-2719.1	-1121.6	951.1	-4.53	-8.79	-0.63
226.0	-2500.670	5092.897	3161.474	-2728.2	-1139.2	949.8	-4.56	-8.82	-0.62
228.0	-2506.135	5090.601	3163.372	-2737.3	-1156.8	948.6	-4.58	-8.84	-0.61
230.0	-2511.619	5088.269	3165.268	-2746.5	-1174.5	947.4	-4.60	-8.86	-0.59
232.0	-2517.121	5085.902	3167.162	-2755.7	-1192.3	946.2	-4.64	-8.88	-0.58
234.0	-2522.642	5083.500	3169.053	-2765.0	-1210.1	945.1	-4.68	-8.91	-0.57
236.0	-2528.181	5081.062	3170.942	-2774.4	-1227.9	943.9	-4.71	-8.92	-0.56
238.0	-2533.739	5078.589	3172.829	-2783.9	-1245.7	942.8	-4.73	-8.94	-0.55
240.0	-2539.317	5076.079	3174.714	-2793.3	-1263.6	941.7	-4.75	-8.95	-0.54
242.0	-2544.913	5073.534	3176.596	-2802.9	-1281.6	940.7	-4.80	-8.99	-0.53
244.0	-2550.528	5070.953	3178.476	-2812.5	-1299.6	939.6	-4.84	-9.02	-0.52
246.0	-2556.163	5068.336	3180.355	-2822.2	-1317.6	938.6	-4.87	-9.03	-0.51
248.0	-2561.817	5065.682	3182.231	-2832.0	-1335.7	937.6	-4.90	-9.06	-0.50
250.0	-2567.491	5062.993	3184.105	-2841.9	-1353.9	936.6	-4.94	-9.08	-0.49
252.0	-2573.185	5060.267	3185.977	-2851.8	-1372.0	935.6	-4.97	-9.10	-0.48
254.0	-2578.898	5057.505	3187.847	-2861.7	-1390.3	934.7	-4.99	-9.13	-0.48
256.0	-2584.632	5054.706	3189.716	-2871.8	-1408.6	933.7	-5.03	-9.16	-0.47
258.0	-2590.385	5051.870	3191.582	-2881.8	-1426.9	932.8	-5.07	-9.18	-0.45
260.0	-2596.159	5048.998	3193.447	-2892.0	-1445.3	931.9	-5.10	-9.20	-0.44
262.0	-2601.953	5046.089	3195.310	-2902.3	-1463.7	931.0	-5.14	-9.22	-0.42
264.0	-2607.768	5043.143	3197.171	-2912.6	-1482.2	930.2	-5.18	-9.26	-0.41

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
266.0	-2613.604	5040.160	3199.031	-2923.0	-1500.7	929.4	-5.20	-9.29	-0.41
268.0	-2619.460	5037.140	3200.889	-2933.4	-1519.3	928.6	-5.24	-9.32	-0.41
270.0	-2625.338	5034.083	3202.745	-2943.9	-1538.0	927.8	-5.28	-9.34	-0.40
272.0	-2631.236	5030.989	3204.600	-2954.5	-1556.7	927.0	-5.33	-9.38	-0.38
274.0	-2637.156	5027.856	3206.453	-2965.2	-1575.5	926.2	-5.36	-9.41	-0.37
276.0	-2643.097	5024.687	3208.305	-2976.0	-1594.3	925.5	-5.39	-9.43	-0.37
278.0	-2649.060	5021.479	3210.155	-2986.8	-1613.2	924.8	-5.45	-9.47	-0.34
280.0	-2655.044	5018.234	3212.004	-2997.8	-1632.2	924.1	-5.49	-9.50	-0.33
282.0	-2661.051	5014.950	3213.851	-3008.7	-1651.2	923.4	-5.51	-9.52	-0.32
284.0	-2667.079	5011.629	3215.698	-3019.8	-1670.3	922.8	-5.54	-9.55	-0.32
286.0	-2673.130	5008.269	3217.543	-3030.9	-1689.4	922.2	-5.58	-9.58	-0.32
288.0	-2679.203	5004.871	3219.386	-3042.1	-1708.6	921.5	-5.62	-9.63	-0.31
290.0	-2685.299	5001.434	3221.229	-3053.4	-1727.9	920.9	-5.66	-9.66	-0.30
292.0	-2691.417	4997.959	3223.070	-3064.8	-1747.3	920.3	-5.69	-9.70	-0.29
294.0	-2697.558	4994.445	3224.910	-3076.2	-1766.7	919.8	-5.74	-9.73	-0.27
296.0	-2703.722	4990.892	3226.749	-3087.7	-1786.2	919.2	-5.78	-9.75	-0.27
298.0	-2709.909	4987.300	3228.587	-3099.3	-1805.7	918.7	-5.83	-9.78	-0.25
300.0	-2716.119	4983.669	3230.424	-3111.0	-1825.4	918.3	-5.87	-9.83	-0.24
302.0	-2722.353	4979.999	3232.260	-3122.8	-1845.0	917.8	-5.91	-9.87	-0.23
304.0	-2728.610	4976.289	3234.095	-3134.7	-1864.8	917.3	-5.95	-9.91	-0.23
306.0	-2734.892	4972.539	3235.929	-3146.6	-1884.7	916.9	-6.01	-9.95	-0.22
308.0	-2741.197	4968.750	3237.763	-3158.7	-1904.6	916.4	-6.06	-9.98	-0.21
310.0	-2747.526	4964.921	3239.595	-3170.8	-1924.6	916.0	-6.08	-10.02	-0.20
312.0	-2753.880	4961.052	3241.427	-3183.0	-1944.7	915.6	-6.12	-10.06	-0.18
314.0	-2760.259	4957.142	3243.258	-3195.3	-1964.9	915.3	-6.15	-10.11	-0.17
316.0	-2766.662	4953.192	3245.088	-3207.7	-1985.1	914.9	-6.20	-10.15	-0.18
318.0	-2773.089	4949.202	3246.917	-3220.1	-2005.4	914.6	-6.25	-10.19	-0.16
320.0	-2779.542	4945.170	3248.746	-3232.7	-2025.8	914.3	-6.31	-10.22	-0.15
322.0	-2786.020	4941.098	3250.575	-3245.3	-2046.3	914.0	-6.35	-10.27	-0.14
324.0	-2792.523	4936.985	3252.402	-3258.1	-2066.9	913.7	-6.39	-10.31	-0.13
326.0	-2799.052	4932.830	3254.229	-3270.9	-2087.6	913.5	-6.44	-10.36	-0.12
328.0	-2805.607	4928.635	3256.056	-3283.8	-2108.4	913.2	-6.48	-10.40	-0.11
330.0	-2812.188	4924.397	3257.882	-3296.8	-2129.2	913.0	-6.52	-10.44	-0.10
332.0	-2818.795	4920.118	3259.708	-3309.9	-2150.1	912.8	-6.58	-10.49	-0.09
334.0	-2825.428	4915.796	3261.534	-3323.2	-2171.2	912.7	-6.64	-10.54	-0.08
336.0	-2832.087	4911.433	3263.359	-3336.5	-2192.3	912.5	-6.69	-10.59	-0.07
338.0	-2838.774	4907.027	3265.184	-3349.9	-2213.5	912.4	-6.72	-10.64	-0.06
340.0	-2845.487	4902.579	3267.008	-3363.4	-2234.9	912.3	-6.77	-10.69	-0.05
342.0	-2852.227	4898.088	3268.833	-3377.0	-2256.3	912.1	-6.82	-10.74	-0.05
344.0	-2858.995	4893.554	3270.657	-3390.7	-2277.8	912.1	-6.88	-10.79	-0.04
346.0	-2865.790	4888.976	3272.481	-3404.5	-2299.4	912.0	-6.94	-10.83	-0.03
348.0	-2872.613	4884.356	3274.305	-3418.4	-2321.1	912.0	-6.99	-10.89	-0.02
350.0	-2879.464	4879.692	3276.129	-3432.5	-2343.0	911.9	-7.04	-10.95	-0.02

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
352.0	-2886.343	4874.984	3277.953	-3446.6	-2364.9	911.9	-7.08	-10.99	-0.01
354.0	-2893.250	4870.232	3279.776	-3460.8	-2387.0	911.9	-7.13	-11.06	-0.00
356.0	-2900.186	4865.436	3281.600	-3475.1	-2409.1	911.9	-7.19	-11.11	0.01
358.0	-2907.151	4860.595	3283.424	-3489.6	-2431.4	911.9	-7.26	-11.16	0.03
360.0	-2914.144	4855.710	3285.248	-3504.1	-2453.8	912.0	-7.31	-11.21	0.03
362.0	-2921.167	4850.780	3287.072	-3518.8	-2476.3	912.1	-7.34	-11.27	0.04
364.0	-2928.220	4845.805	3288.896	-3533.5	-2498.9	912.1	-7.41	-11.33	0.04
366.0	-2935.302	4840.785	3290.721	-3548.4	-2521.6	912.2	-7.48	-11.39	0.06
368.0	-2942.413	4835.719	3292.545	-3563.4	-2544.4	912.4	-7.52	-11.44	0.08
370.0	-2949.555	4830.607	3294.370	-3578.5	-2567.4	912.5	-7.57	-11.51	0.08
372.0	-2956.728	4825.449	3296.195	-3593.7	-2590.4	912.7	-7.63	-11.56	0.08
374.0	-2963.930	4820.245	3298.021	-3609.0	-2613.6	912.9	-7.69	-11.62	0.10
376.0	-2971.164	4814.995	3299.847	-3624.5	-2636.9	913.1	-7.76	-11.69	0.11
378.0	-2978.428	4809.697	3301.673	-3640.1	-2660.4	913.3	-7.82	-11.77	0.13
380.0	-2985.724	4804.353	3303.500	-3655.8	-2684.0	913.6	-7.88	-11.85	0.15
382.0	-2993.051	4798.961	3305.328	-3671.6	-2707.7	913.9	-7.94	-11.91	0.16
384.0	-3000.410	4793.522	3307.156	-3687.5	-2731.6	914.2	-8.00	-11.96	0.17
386.0	-3007.802	4788.035	3308.985	-3703.6	-2755.6	914.6	-8.05	-12.03	0.18
388.0	-3015.225	4782.499	3310.814	-3719.8	-2779.7	914.9	-8.13	-12.10	0.18
390.0	-3022.681	4776.916	3312.644	-3736.1	-2804.0	915.3	-8.19	-12.17	0.19
392.0	-3030.169	4771.283	3314.475	-3752.5	-2828.4	915.7	-8.26	-12.25	0.20
394.0	-3037.691	4765.602	3316.307	-3769.1	-2853.0	916.1	-8.33	-12.32	0.20
396.0	-3045.246	4759.871	3318.140	-3785.8	-2877.7	916.5	-8.42	-12.40	0.21
398.0	-3052.834	4754.091	3319.973	-3802.8	-2902.6	917.0	-8.49	-12.49	0.24
400.0	-3060.457	4748.261	3321.808	-3819.8	-2927.6	917.4	-8.54	-12.55	0.24
402.0	-3068.113	4742.380	3323.643	-3836.9	-2952.8	917.9	-8.60	-12.63	0.25
404.0	-3075.805	4736.449	3325.479	-3854.2	-2978.1	918.4	-8.67	-12.70	0.26
406.0	-3083.530	4730.468	3327.317	-3871.6	-3003.6	919.0	-8.75	-12.78	0.27
408.0	-3091.291	4724.435	3329.155	-3889.2	-3029.3	919.5	-8.83	-12.87	0.28
410.0	-3099.087	4718.350	3330.995	-3906.9	-3055.1	920.1	-8.91	-12.94	0.29
412.0	-3106.919	4712.214	3332.836	-3924.8	-3081.1	920.7	-8.97	-13.03	0.30
414.0	-3114.787	4706.026	3334.678	-3942.8	-3107.2	921.3	-9.04	-13.12	0.31
416.0	-3122.690	4699.785	3336.521	-3961.0	-3133.6	921.9	-9.12	-13.21	0.32
418.0	-3130.631	4693.492	3338.365	-3979.3	-3160.1	922.6	-9.22	-13.30	0.33
420.0	-3138.608	4687.145	3340.211	-3997.8	-3186.8	923.3	-9.30	-13.39	0.35
422.0	-3146.622	4680.744	3342.058	-4016.5	-3213.6	924.0	-9.38	-13.48	0.37
424.0	-3154.674	4674.290	3343.907	-4035.3	-3240.7	924.7	-9.46	-13.56	0.37
426.0	-3162.764	4667.782	3345.757	-4054.4	-3267.9	925.5	-9.55	-13.65	0.37
428.0	-3170.892	4661.219	3347.609	-4073.5	-3295.3	926.2	-9.64	-13.76	0.38
430.0	-3179.058	4654.600	3349.462	-4092.9	-3322.9	927.0	-9.74	-13.87	0.40
432.0	-3187.263	4647.927	3351.317	-4112.5	-3350.7	927.8	-9.81	-13.97	0.42
434.0	-3195.508	4641.197	3353.173	-4132.1	-3378.7	928.6	-9.89	-14.07	0.44
436.0	-3203.792	4634.412	3355.032	-4151.9	-3407.0	929.5	-9.98	-14.17	0.46

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
438.0	-3212.116	4627.569	3356.891	-4172.0	-3435.4	930.4	-10.06	-14.27	0.48
440.0	-3220.480	4620.670	3358.753	-4192.2	-3464.0	931.3	-10.15	-14.37	0.50
442.0	-3228.886	4613.713	3360.617	-4212.6	-3492.8	932.3	-10.23	-14.47	0.52
444.0	-3237.332	4606.698	3362.482	-4233.2	-3521.8	933.3	-10.32	-14.58	0.54
446.0	-3245.819	4599.625	3364.350	-4253.7	-3550.9	934.1	-9.31	-14.12	0.14
448.0	-3254.342	4592.496	3366.218	-4269.4	-3577.6	933.3	-7.21	-13.04	-0.66
450.0	-3262.895	4585.315	3368.083	-4283.8	-3603.8	932.0	-7.19	-13.12	-0.69
452.0	-3271.478	4578.081	3369.946	-4298.2	-3630.1	930.5	-7.17	-13.20	-0.73
454.0	-3280.089	4570.794	3371.805	-4312.5	-3656.6	929.0	-7.15	-13.28	-0.76
456.0	-3288.728	4563.454	3373.662	-4327.0	-3683.3	927.6	-7.16	-13.36	-0.77
458.0	-3297.397	4556.061	3375.516	-4341.4	-3710.1	926.0	-7.23	-13.43	-0.77
460.0	-3306.094	4548.614	3377.366	-4355.9	-3737.0	924.5	-7.28	-13.48	-0.77
462.0	-3314.820	4541.113	3379.213	-4370.5	-3764.0	922.9	-7.31	-13.54	-0.79
464.0	-3323.576	4533.558	3381.058	-4385.1	-3791.2	921.3	-7.35	-13.60	-0.79
466.0	-3332.361	4525.948	3382.899	-4399.9	-3818.5	919.8	-7.42	-13.70	-0.80
468.0	-3341.175	4518.284	3384.737	-4414.8	-3846.0	918.2	-7.48	-13.79	-0.80
470.0	-3350.020	4510.564	3386.572	-4429.8	-3873.6	916.6	-7.54	-13.87	-0.80
472.0	-3358.895	4502.789	3388.403	-4444.9	-3901.4	915.0	-7.58	-13.95	-0.80
474.0	-3367.800	4494.959	3390.231	-4460.1	-3929.4	913.4	-7.62	-14.01	-0.79
476.0	-3376.735	4487.072	3392.057	-4475.4	-3957.5	911.8	-7.67	-14.09	-0.80
478.0	-3385.702	4479.128	3393.879	-4490.9	-3985.8	910.2	-7.75	-14.17	-0.81
480.0	-3394.699	4471.129	3395.697	-4506.4	-4014.2	908.5	-7.83	-14.25	-0.82
482.0	-3403.727	4463.072	3397.513	-4522.1	-4042.7	906.9	-7.86	-14.31	-0.83
484.0	-3412.787	4454.958	3399.325	-4537.9	-4071.4	905.2	-7.88	-14.40	-0.84
486.0	-3421.879	4446.786	3401.134	-4553.6	-4100.3	903.5	-7.91	-14.47	-0.85
488.0	-3431.002	4438.556	3402.939	-4569.5	-4129.3	901.9	-7.97	-14.58	-0.84
490.0	-3440.157	4430.268	3404.741	-4585.5	-4158.6	900.2	-8.02	-14.68	-0.85
492.0	-3449.344	4421.922	3406.540	-4601.6	-4188.0	898.4	-8.07	-14.76	-0.85
494.0	-3458.563	4413.516	3408.335	-4617.8	-4217.7	896.7	-8.15	-14.88	-0.86
496.0	-3467.815	4405.051	3410.127	-4634.2	-4247.6	895.0	-8.26	-15.02	-0.85
498.0	-3477.100	4396.526	3411.915	-4650.8	-4277.7	893.3	-8.36	-15.16	-0.85
500.0	-3486.419	4387.940	3413.700	-4667.6	-4308.1	891.6	-8.40	-15.22	-0.88
502.0	-3495.771	4379.293	3415.482	-4684.4	-4338.5	889.9	-8.39	-15.21	-0.88
504.0	-3505.156	4370.586	3417.259	-4701.2	-4369.0	888.1	-8.41	-15.26	-0.88
506.0	-3514.576	4361.817	3419.034	-4718.1	-4399.7	886.4	-8.50	-15.40	-0.86
508.0	-3524.029	4352.987	3420.805	-4735.2	-4430.7	884.7	-8.61	-15.58	-0.85
510.0	-3533.517	4344.094	3422.573	-4752.5	-4461.9	882.9	-8.69	-15.71	-0.86
512.0	-3543.039	4335.139	3424.337	-4770.0	-4493.4	881.2	-8.77	-15.79	-0.86
514.0	-3552.596	4326.120	3426.097	-4787.5	-4525.1	879.4	-8.85	-15.88	-0.86
516.0	-3562.190	4317.038	3427.855	-4805.3	-4556.9	877.7	-8.95	-15.98	-0.84
518.0	-3571.818	4307.892	3429.608	-4823.3	-4589.0	876.1	-9.05	-16.06	-0.81
520.0	-3581.483	4298.682	3431.359	-4841.5	-4621.2	874.5	-9.16	-16.14	-0.78
522.0	-3591.190	4289.403	3433.108	-4859.9	-4653.5	873.0	-9.27	-16.22	-0.75

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TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
524.0	-3600.928	4280.063	3434.852	-4878.5	-4686.1	871.6	-9.25	-16.37	-0.51
S-II ENGINE CUTOFF									
524.040	-3601.122	4279.876	3434.887	-4878.9	-4686.7	871.5	-9.25	-16.37	-0.50
S-II/S-IVB SEPARATION COMMAND									
524.900	-3605.315	4275.844	3435.634	-4877.6	-4694.1	868.3	4.97	-6.10	-4.91
526.0	-3610.673	4270.680	3436.585	-4872.2	-4700.8	862.8	4.97	-6.10	-4.92
528.0	-3620.407	4261.266	3438.300	-4862.2	-4713.1	853.2	4.66	-6.30	-4.82
530.0	-3630.124	4251.826	3439.998	-4854.6	-4726.9	844.2	1.94	-8.14	-3.92
532.0	-3639.831	4242.355	3441.679	-4852.1	-4744.2	836.8	0.97	-8.84	-3.62
534.0	-3649.533	4232.848	3443.345	-4850.4	-4762.0	829.5	0.78	-9.03	-3.58
536.0	-3659.233	4223.305	3444.997	-4848.9	-4780.4	822.3	0.77	-9.20	-3.64
538.0	-3668.929	4213.726	3446.634	-4847.2	-4799.0	814.9	0.86	-9.35	-3.75
540.0	-3678.622	4204.109	3448.256	-4845.4	-4817.9	807.3	0.92	-9.56	-3.84
542.0	-3688.311	4194.454	3449.863	-4843.5	-4837.1	799.5	0.98	-9.70	-3.93
544.0	-3697.996	4184.761	3451.454	-4841.5	-4856.6	791.6	1.04	-9.78	-4.00
546.0	-3707.677	4175.028	3453.029	-4839.4	-4876.2	783.5	1.07	-9.78	-4.03
548.0	-3717.353	4165.256	3454.588	-4837.3	-4895.7	775.5	1.06	-9.77	-4.01
550.0	-3727.026	4155.445	3456.131	-4835.1	-4915.3	767.5	1.05	-9.75	-3.97
552.0	-3736.694	4145.595	3457.658	-4833.0	-4934.8	759.6	1.06	-9.75	-3.98
554.0	-3746.358	4135.706	3459.170	-4830.9	-4954.3	751.5	1.10	-9.75	-4.03
556.0	-3756.017	4125.778	3460.665	-4828.7	-4973.8	743.5	1.12	-9.76	-4.06
558.0	-3765.673	4115.811	3462.143	-4826.4	-4993.3	735.3	1.14	-9.75	-4.07
560.0	-3775.323	4105.805	3463.606	-4824.1	-5012.8	727.2	1.15	-9.75	-4.06
562.0	-3784.969	4095.760	3465.052	-4821.8	-5032.3	719.1	1.16	-9.75	-4.07
564.0	-3794.610	4085.675	3466.482	-4819.5	-5051.8	710.9	1.17	-9.75	-4.07
566.0	-3804.247	4075.552	3467.896	-4817.2	-5071.3	702.8	1.16	-9.75	-4.09
568.0	-3813.879	4065.390	3469.293	-4814.9	-5090.8	694.6	1.15	-9.75	-4.08
570.0	-3823.506	4055.189	3470.674	-4812.6	-5110.3	686.5	1.15	-9.74	-4.07
572.0	-3833.129	4044.949	3472.039	-4810.3	-5129.8	678.3	1.15	-9.75	-4.09
574.0	-3842.747	4034.670	3473.388	-4807.9	-5149.2	670.1	1.16	-9.75	-4.09
576.0	-3852.361	4024.352	3474.720	-4805.6	-5168.7	662.0	1.16	-9.75	-4.09
578.0	-3861.970	4013.995	3476.035	-4803.3	-5188.2	653.8	1.17	-9.75	-4.09
580.0	-3871.574	4003.599	3477.335	-4800.9	-5207.8	645.6	1.17	-9.75	-4.10
582.0	-3881.174	3993.164	3478.618	-4798.6	-5227.3	637.4	1.19	-9.76	-4.11
584.0	-3890.768	3982.690	3479.884	-4796.2	-5246.8	629.2	1.20	-9.76	-4.11
586.0	-3900.358	3972.177	3481.134	-4793.8	-5266.3	620.9	1.21	-9.75	-4.11
588.0	-3909.943	3961.625	3482.368	-4791.4	-5285.8	612.7	1.20	-9.73	-4.11
590.0	-3919.524	3951.034	3483.585	-4789.0	-5305.3	604.5	1.19	-9.74	-4.11
592.0	-3929.099	3940.404	3484.786	-4786.6	-5324.8	596.3	1.18	-9.77	-4.10

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
594.0	-3938.670	3929.735	3485.971	-4784.3	-5344.3	588.1	1.18	-9.78	-4.10
596.0	-3948.236	3919.027	3487.139	-4781.9	-5363.9	579.9	1.18	-9.79	-4.10
598.0	-3957.798	3908.280	3488.290	-4779.5	-5383.4	571.7	1.19	-9.78	-4.10
600.0	-3967.355	3897.493	3489.425	-4777.1	-5403.0	563.5	1.20	-9.79	-4.12
602.0	-3976.906	3886.667	3490.544	-4774.7	-5422.6	555.2	1.21	-9.81	-4.13
604.0	-3986.453	3875.803	3491.646	-4772.3	-5442.2	547.0	1.22	-9.80	-4.13
606.0	-3995.996	3864.899	3492.732	-4769.9	-5461.8	538.7	1.22	-9.78	-4.12
608.0	-4005.533	3853.955	3493.801	-4767.4	-5481.4	530.5	1.23	-9.78	-4.12
610.0	-4015.065	3842.973	3494.854	-4765.0	-5500.9	522.3	1.24	-9.77	-4.11
612.0	-4024.593	3831.952	3495.890	-4762.5	-5520.4	514.0	1.25	-9.74	-4.12
614.0	-4034.115	3820.892	3496.910	-4760.0	-5539.9	505.8	1.24	-9.73	-4.11
616.0	-4043.633	3809.792	3497.913	-4757.5	-5559.4	497.6	1.24	-9.74	-4.10
618.0	-4053.145	3798.654	3498.900	-4755.0	-5578.8	489.4	1.24	-9.74	-4.10
620.0	-4062.653	3787.477	3499.871	-4752.6	-5598.3	481.2	1.24	-9.72	-4.09
622.0	-4072.156	3776.261	3500.825	-4750.1	-5617.7	473.0	1.23	-9.70	-4.09
624.0	-4081.653	3765.006	3501.763	-4747.6	-5637.1	464.8	1.23	-9.72	-4.10
626.0	-4091.146	3753.713	3502.684	-4745.2	-5656.6	456.6	1.24	-9.73	-4.10
628.0	-4100.634	3742.380	3503.589	-4742.7	-5676.0	448.4	1.25	-9.71	-4.09
630.0	-4110.117	3731.009	3504.478	-4740.2	-5695.4	440.2	1.24	-9.70	-4.09
632.0	-4119.595	3719.598	3505.350	-4737.7	-5714.8	432.1	1.23	-9.71	-4.09
634.0	-4129.068	3708.149	3506.206	-4735.3	-5734.3	423.9	1.22	-9.75	-4.09
636.0	-4138.536	3696.661	3507.046	-4732.9	-5753.8	415.7	1.21	-9.75	-4.09
638.0	-4147.999	3685.134	3507.869	-4730.4	-5773.3	407.5	1.22	-9.76	-4.08
640.0	-4157.458	3673.568	3508.676	-4728.0	-5792.9	399.3	1.20	-9.78	-4.10
642.0	-4166.911	3661.963	3509.466	-4725.6	-5812.4	391.1	1.21	-9.78	-4.09
644.0	-4176.360	3650.318	3510.240	-4723.1	-5832.0	382.9	1.23	-9.77	-4.10
646.0	-4185.804	3638.635	3510.998	-4720.6	-5851.5	374.7	1.25	-9.74	-4.11
648.0	-4195.243	3626.912	3511.739	-4718.1	-5871.0	366.5	1.27	-9.74	-4.10
650.0	-4204.676	3615.151	3512.464	-4715.6	-5890.4	358.3	1.26	-9.74	-4.10
652.0	-4214.105	3603.351	3513.173	-4713.1	-5909.9	350.2	1.25	-9.74	-4.09
654.0	-4223.529	3591.511	3513.865	-4710.7	-5929.4	342.0	1.20	-9.71	-4.06
656.0	-4232.948	3579.633	3514.541	-4708.3	-5948.7	333.9	1.14	-9.67	-4.02
658.0	-4242.362	3567.716	3515.201	-4706.1	-5968.1	325.9	1.11	-9.65	-3.99
660.0	-4251.772	3555.761	3515.845	-4703.9	-5987.4	317.9	1.11	-9.65	-4.00
662.0	-4261.178	3543.767	3516.472	-4701.6	-6006.6	309.9	1.13	-9.65	-4.00
664.0	-4270.579	3531.734	3517.084	-4699.4	-6026.0	301.9	1.14	-9.66	-4.00
666.0	-4279.975	3519.663	3517.680	-4697.1	-6045.3	293.9	1.14	-9.65	-4.00
668.0	-4289.367	3507.553	3518.260	-4694.8	-6064.6	285.9	1.12	-9.65	-3.99
670.0	-4298.755	3495.405	3518.824	-4692.6	-6083.9	277.9	1.11	-9.67	-3.99
672.0	-4308.138	3483.218	3519.372	-4690.4	-6103.2	270.0	1.10	-9.68	-3.99
674.0	-4317.516	3470.992	3519.904	-4688.2	-6122.6	262.0	1.12	-9.67	-3.99
676.0	-4326.890	3458.727	3520.420	-4685.9	-6141.9	254.0	1.13	-9.67	-3.99
678.0	-4336.260	3446.424	3520.920	-4683.7	-6161.2	246.0	1.13	-9.67	-3.99

TABLE B-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
680.0	-4345.625	3434.083	3521.404	-4681.4	-6180.6	238.0	1.14	-9.66	-3.99
682.0	-4354.986	3421.702	3521.872	-4679.2	-6199.9	230.0	1.14	-9.67	-3.99
684.0	-4364.342	3409.283	3522.324	-4676.9	-6219.2	222.0	1.15	-9.66	-3.99
S-IVB FIRST GUIDANCE CUTOFF									
684.980	-4368.924	3403.183	3522.539	-4675.7	-6228.7	218.1	1.16	-9.67	-3.97
686.0	-4373.690	3396.828	3522.759	-4670.7	-6234.8	213.3	6.17	-4.74	-5.06
688.0	-4383.018	3384.350	3523.175	-4658.3	-6244.3	203.2	6.22	-4.76	-4.99
690.0	-4392.322	3371.853	3523.572	-4645.9	-6253.8	193.2	6.22	-4.74	-4.98
692.0	-4401.601	3359.336	3523.949	-4633.4	-6263.3	183.3	6.22	-4.73	-4.98
694.0	-4410.856	3346.800	3524.305	-4621.0	-6272.7	173.3	6.23	-4.72	-4.98
PARKING ORBIT INSERTION									
694.980	-4415.379	3340.648	3524.471	-4614.9	-6277.2	168.5	6.22	-4.71	-4.98

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
GUIDANCE REFERENCE RELEASE											
-16.970	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-16.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-15.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-14.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-13.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-12.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-11.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-10.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-9.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-8.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-7.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-6.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-5.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-4.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-3.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-2.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-1.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
-0.0	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
FIRST MOTION											
0.330	6373.355	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	408.6	0	60
IU UMBILICAL DISCONNECT											
0.670	6373.355	-80.6041	28.4470	359.49	89.26	0.7	90.00	0.09	408.6	0	60
1.0	6373.355	-80.6041	28.4470	359.95	89.14	1.5	90.00	0.20	408.6	0	60
2.0	6373.358	-80.6041	28.4470	4.79	88.77	4.0	89.99	0.56	408.7	0	63
3.0	6373.363	-80.6041	28.4470	13.90	88.69	6.6	89.98	0.92	408.7	0	68
4.0	6373.371	-80.6041	28.4470	44.29	89.05	9.3	89.98	1.30	408.9	0	76
5.0	6373.382	-80.6041	28.4470	103.97	89.03	12.0	90.01	1.68	409.0	0	86
6.0	6373.395	-80.6041	28.4470	130.99	88.50	14.8	90.04	2.08	409.2	0	100
7.0	6373.412	-80.6041	28.4470	142.81	87.96	17.7	90.07	2.48	409.4	1	116
8.0	6373.431	-80.6041	28.4470	148.70	87.50	20.7	90.11	2.89	409.6	1	135
9.0	6373.453	-80.6041	28.4469	152.41	87.14	23.7	90.15	3.31	409.9	2	157
10.0	6373.478	-80.6041	28.4469	155.04	86.87	26.8	90.19	3.73	410.1	3	183
11.0	6373.506	-80.6041	28.4469	157.02	86.71	29.9	90.22	4.17	410.4	5	211
12.0	6373.538	-80.6041	28.4469	158.07	86.71	33.1	90.25	4.62	410.7	7	242
13.0	6373.572	-80.6041	28.4469	157.67	86.86	36.4	90.26	5.07	411.0	9	277
14.0	6373.610	-80.6041	28.4469	155.07	87.09	39.7	90.26	5.53	411.4	11	315

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
15.0	6373.652	-80.6041	28.4469	149.63	87.29	43.0	90.25	5.99	411.9	13	356
16.0	6373.696	-80.6041	28.4468	141.93	87.39	46.5	90.23	6.46	412.6	15	401
17.0	6373.745	-80.6040	28.4468	133.16	87.38	50.0	90.22	6.94	413.4	17	449
18.0	6373.796	-80.6040	28.4468	124.37	87.27	53.6	90.20	7.43	414.3	19	501
19.0	6373.852	-80.6040	28.4468	116.07	87.08	57.3	90.18	7.93	415.3	22	556
20.0	6373.911	-80.6040	28.4468	108.45	86.82	61.2	90.15	8.43	416.4	25	616
21.0	6373.974	-80.6039	28.4467	101.66	86.48	65.1	90.11	8.95	417.7	30	679
22.0	6374.037	-80.6039	28.4467	96.07	86.06	69.1	90.07	9.47	419.1	35	741
23.0	6374.105	-80.6038	28.4467	91.55	85.59	73.2	90.02	9.98	420.7	40	810
24.0	6374.180	-80.6037	28.4467	87.99	85.06	77.3	89.97	10.51	422.4	45	885
25.0	6374.259	-80.6037	28.4467	85.17	84.47	81.6	89.91	11.04	424.4	52	964
26.0	6374.343	-80.6036	28.4467	82.95	83.85	86.0	89.85	11.56	426.5	59	1047
27.0	6374.430	-80.6035	28.4467	81.12	83.20	90.5	89.77	12.09	428.8	68	1135
28.0	6374.522	-80.6034	28.4468	79.57	82.54	95.0	89.70	12.62	431.3	78	1227
29.0	6374.619	-80.6032	28.4468	78.37	81.87	99.7	89.61	13.15	433.9	90	1323
30.0	6374.720	-80.6031	28.4468	77.38	81.18	104.5	89.53	13.68	436.8	105	1424
31.0	6374.825	-80.6029	28.4468	76.59	80.50	109.4	89.44	14.21	439.8	121	1530
32.0	6374.936	-80.6027	28.4469	75.93	79.82	114.5	89.34	14.73	442.9	139	1640
33.0	6375.051	-80.6025	28.4469	75.38	79.16	119.6	89.24	15.26	446.3	160	1755
34.0	6375.170	-80.6023	28.4470	74.94	78.49	124.9	89.14	15.78	449.8	183	1875
35.0	6375.295	-80.6020	28.4470	74.57	77.83	130.2	89.04	16.30	453.5	208	2000
36.0	6375.425	-80.6017	28.4471	74.28	77.18	135.7	88.93	16.82	457.4	236	2130
37.0	6375.560	-80.6014	28.4472	74.02	76.52	141.4	88.82	17.33	461.5	267	2265
38.0	6375.700	-80.6011	28.4473	73.80	75.85	147.2	88.70	17.84	465.8	301	2405
39.0	6375.845	-80.6007	28.4473	73.60	75.17	153.1	88.58	18.33	470.4	339	2550
40.0	6375.996	-80.6003	28.4474	73.43	74.48	159.1	88.45	18.82	475.2	379	2701
41.0	6376.152	-80.5999	28.4476	73.30	73.80	165.3	88.32	19.31	480.2	423	2857
42.0	6376.314	-80.5994	28.4477	73.18	73.10	171.7	88.19	19.78	485.5	471	3018
43.0	6376.481	-80.5989	28.4478	73.08	72.41	178.2	88.05	20.24	490.9	522	3186
44.0	6376.653	-80.5983	28.4480	73.01	71.72	184.8	87.91	20.69	496.6	578	3358
45.0	6376.832	-80.5978	28.4481	72.96	71.03	191.6	87.77	21.14	502.6	638	3537
46.0	6377.016	-80.5971	28.4483	72.93	70.35	198.6	87.62	21.57	508.8	702	3721
47.0	6377.206	-80.5965	28.4484	72.92	69.68	205.8	87.48	22.00	515.2	771	3911
48.0	6377.402	-80.5957	28.4486	72.94	69.01	213.1	87.34	22.41	521.8	845	4107
49.0	6377.604	-80.5950	28.4488	72.97	68.34	220.6	87.19	22.81	528.7	923	4309
50.0	6377.812	-80.5941	28.4491	73.01	67.67	228.2	87.05	23.20	535.8	1007	4517
51.0	6378.026	-80.5933	28.4493	73.05	67.01	236.0	86.91	23.58	543.2	1097	4731
52.0	6378.246	-80.5923	28.4495	73.08	66.36	244.0	86.76	23.95	550.8	1191	4952
53.0	6378.473	-80.5914	28.4498	73.09	65.71	252.2	86.60	24.30	558.6	1292	5179
54.0	6378.706	-80.5903	28.4501	73.10	65.06	260.5	86.44	24.64	566.7	1399	5412
55.0	6378.946	-80.5892	28.4503	73.09	64.42	269.0	86.28	24.96	574.9	1511	5651
56.0	6379.191	-80.5880	28.4507	73.08	63.79	277.7	86.12	25.28	583.4	1631	5897
57.0	6379.444	-80.5868	28.4510	73.05	63.16	286.6	85.95	25.58	592.2	1756	6150

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
58.0	6379.703	-80.5855	28.4513	73.04	62.55	295.6	85.78	25.88	601.1	1889	6409
59.0	6379.969	-80.5841	28.4517	73.02	61.95	304.8	85.62	26.16	610.3	2029	6675
60.0	6380.241	-80.5827	28.4521	73.01	61.35	314.2	85.45	26.43	619.6	2176	6947
61.0	6380.520	-80.5812	28.4525	72.99	60.77	323.7	85.28	26.68	629.1	2330	7226
MACH 1											
61.450	6380.648	-80.5805	28.4526	72.99	60.51	328.1	85.21	26.79	633.5	2402	7354
62.0	6380.806	-80.5796	28.4529	72.97	60.20	333.4	85.11	26.93	638.9	2491	7512
63.0	6381.099	-80.5780	28.4533	72.95	59.63	343.3	84.94	27.16	648.8	2661	7805
64.0	6381.398	-80.5762	28.4538	72.93	59.07	353.2	84.77	27.38	658.9	2838	8105
65.0	6381.705	-80.5744	28.4543	72.90	58.52	363.4	84.60	27.59	669.3	3023	8412
66.0	6382.018	-80.5725	28.4548	72.87	57.97	373.8	84.43	27.78	679.8	3217	8725
67.0	6382.339	-80.5705	28.4553	72.85	57.43	384.4	84.26	27.97	690.7	3419	9046
68.0	6382.666	-80.5685	28.4558	72.83	56.89	395.2	84.09	28.15	701.7	3630	9373
69.0	6383.001	-80.5663	28.4564	72.83	56.37	406.2	83.93	28.32	713.0	3850	9708
70.0	6383.343	-80.5641	28.4570	72.83	55.86	417.5	83.77	28.48	724.6	4080	10050
71.0	6383.692	-80.5618	28.4576	72.84	55.36	429.0	83.61	28.64	736.4	4318	10400
72.0	6384.049	-80.5593	28.4583	72.85	54.87	440.8	83.45	28.79	748.5	4567	10757
73.0	6384.413	-80.5568	28.4590	72.87	54.38	452.8	83.30	28.93	760.8	4825	11121
74.0	6384.785	-80.5542	28.4597	72.89	53.90	465.1	83.15	29.07	773.5	5093	11493
75.0	6385.164	-80.5515	28.4604	72.91	53.42	477.6	83.00	29.19	786.4	5372	11873
76.0	6385.552	-80.5486	28.4611	72.93	52.95	490.4	82.85	29.31	799.5	5661	12261
77.0	6385.947	-80.5457	28.4619	72.95	52.47	503.4	82.71	29.41	813.1	5962	12657
78.0	6386.350	-80.5427	28.4627	72.97	51.99	516.7	82.56	29.50	826.9	6274	13069
MAXIMUM DYNAMIC PRESSURE											
78.900	6386.720	-80.5398	28.4635	72.99	51.54	529.0	82.43	29.56	839.6	6564	13430
79.0	6386.761	-80.5395	28.4636	72.99	51.50	530.3	82.41	29.57	841.1	6597	13471
80.0	6387.180	-80.5362	28.4645	73.00	50.99	544.2	82.26	29.62	855.6	6933	13891
81.0	6387.607	-80.5328	28.4654	73.00	50.48	558.4	82.11	29.66	870.5	7281	14318
82.0	6388.042	-80.5293	28.4663	73.01	49.96	572.8	81.95	29.68	885.7	7642	14753
83.0	6388.484	-80.5256	28.4673	73.00	49.42	587.6	81.80	29.68	901.3	8016	15195
84.0	6388.934	-80.5218	28.4683	73.00	48.88	602.7	81.64	29.66	917.3	8405	15646
85.0	6389.392	-80.5179	28.4693	72.99	48.32	618.0	81.48	29.63	933.6	8807	16104
86.0	6389.858	-80.5138	28.4704	72.98	47.77	633.7	81.32	29.59	950.3	9225	16570
87.0	6390.331	-80.5096	28.4715	72.98	47.21	649.7	81.17	29.53	967.3	9657	17043
88.0	6390.811	-80.5052	28.4727	72.96	46.65	666.1	81.01	29.46	984.7	10105	17524
89.0	6391.299	-80.5006	28.4739	72.95	46.09	682.8	80.85	29.39	1002.5	10569	18012
90.0	6391.795	-80.4959	28.4752	72.93	45.54	699.8	80.70	29.30	1020.5	11050	18508
91.0	6392.298	-80.4911	28.4765	72.91	44.99	717.1	80.54	29.21	1038.9	11547	19012
92.0	6392.809	-80.4861	28.4778	72.88	44.46	734.7	80.38	29.11	1057.6	12061	19523

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
93.0	6393.327	-80.4809	28.4792	72.86	43.93	752.7	80.23	29.01	1076.6	12593	20042
94.0	6393.853	-80.4755	28.4807	72.83	43.41	771.0	80.07	28.91	1095.9	13142	20569
95.0	6394.387	-80.4700	28.4821	72.80	42.90	789.6	79.92	28.80	1115.5	13709	21103
96.0	6394.928	-80.4642	28.4837	72.77	42.39	808.6	79.77	28.69	1135.5	14295	21645
97.0	6395.477	-80.4583	28.4853	72.74	41.90	827.9	79.62	28.58	1155.8	14900	22194
98.0	6396.034	-80.4522	28.4869	72.72	41.42	847.5	79.48	28.46	1176.4	15523	22751
99.0	6396.599	-80.4460	28.4886	72.70	40.94	867.4	79.34	28.34	1197.3	16166	23316
100.0	6397.171	-80.4395	28.4904	72.68	40.47	887.7	79.20	28.22	1218.5	16829	23889
101.0	6397.751	-80.4328	28.4922	72.66	40.01	908.4	79.07	28.10	1240.1	17512	24470
102.0	6398.339	-80.4259	28.4941	72.64	39.56	929.3	78.94	27.97	1262.0	18215	25058
103.0	6398.935	-80.4189	28.4960	72.63	39.12	950.7	78.82	27.84	1284.3	18939	25655
104.0	6399.538	-80.4116	28.4980	72.62	38.68	972.4	78.70	27.71	1306.9	19685	26259
105.0	6400.150	-80.4041	28.5000	72.60	38.25	994.4	78.58	27.58	1329.8	20451	26871
106.0	6400.770	-80.3964	28.5022	72.59	37.82	1016.8	78.46	27.44	1353.1	21240	27492
107.0	6401.397	-80.3885	28.5043	72.58	37.40	1039.5	78.34	27.30	1376.7	22051	28120
108.0	6402.032	-80.3804	28.5065	72.56	36.98	1062.6	78.22	27.16	1400.7	22884	28756
109.0	6402.676	-80.3720	28.5088	72.55	36.57	1086.1	78.11	27.01	1425.1	23741	29400
110.0	6403.327	-80.3634	28.5112	72.53	36.16	1110.0	77.99	26.85	1449.8	24621	30052
111.0	6403.985	-80.3546	28.5136	72.51	35.75	1134.2	77.88	26.70	1474.9	25525	30711
112.0	6404.652	-80.3455	28.5161	72.50	35.35	1158.8	77.77	26.54	1500.3	26453	31379
113.0	6405.326	-80.3362	28.5187	72.49	34.95	1183.8	77.67	26.38	1526.2	27406	32054
114.0	6406.008	-80.3267	28.5213	72.47	34.56	1209.2	77.57	26.22	1552.4	28384	32737
115.0	6406.698	-80.3169	28.5240	72.46	34.19	1234.9	77.47	26.07	1579.0	29387	33427
116.0	6407.396	-80.3069	28.5268	72.46	33.82	1261.1	77.37	25.91	1606.0	30417	34126
117.0	6408.102	-80.2966	28.5296	72.45	33.46	1287.7	77.28	25.76	1633.3	31472	34833
118.0	6408.816	-80.2860	28.5325	72.45	33.11	1314.7	77.19	25.61	1661.0	32554	35548
119.0	6409.538	-80.2752	28.5355	72.45	32.77	1342.0	77.10	25.47	1689.2	33662	36271
120.0	6410.268	-80.2641	28.5386	72.45	32.43	1369.8	77.02	25.32	1717.7	34798	37002
121.0	6411.008	-80.2528	28.5417	72.45	32.11	1398.1	76.94	25.18	1746.6	35962	37742
122.0	6411.756	-80.2411	28.5449	72.45	31.80	1426.8	76.86	25.04	1776.0	37153	38491
123.0	6412.512	-80.2292	28.5482	72.45	31.49	1456.0	76.79	24.91	1805.8	38373	39249
124.0	6413.277	-80.2171	28.5516	72.45	31.19	1485.5	76.71	24.77	1836.0	39621	40015
125.0	6414.052	-80.2046	28.5550	72.45	30.90	1515.6	76.64	24.64	1866.7	40899	40790
S-IC INBOARD ENGINE CUTOFF											
125.880	6414.740	-80.1934	28.5581	72.45	30.65	1542.3	76.57	24.53	1894.0	42048	41480
126.0	6414.835	-80.1918	28.5586	72.45	30.61	1546.0	76.56	24.51	1897.7	42206	41574
127.0	6415.625	-80.1788	28.5622	72.45	30.33	1572.3	76.50	24.36	1924.7	43541	42366
128.0	6416.422	-80.1655	28.5658	72.45	30.04	1596.2	76.44	24.20	1949.2	44902	43164
129.0	6417.224	-80.1520	28.5696	72.45	29.76	1620.4	76.39	24.05	1974.0	46287	43967
130.0	6418.030	-80.1382	28.5734	72.45	29.49	1644.9	76.34	23.89	1999.2	47696	44775
131.0	6418.842	-80.1242	28.5772	72.45	29.21	1669.7	76.29	23.73	2024.7	49130	45598

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
132.0	6419.660	-80.1100	28.5812	72.46	28.94	1695.0	76.24	23.58	2050.5	50590	46407
133.0	6420.483	-80.0955	28.5852	72.46	28.68	1720.5	76.19	23.43	2076.7	52076	47231
134.0	6421.311	-80.0807	28.5892	72.45	28.42	1746.5	76.13	23.28	2103.2	53587	48061
135.0	6422.145	-80.0657	28.5934	72.47	28.16	1772.7	76.09	23.13	2130.1	55125	48896
136.0	6422.985	-80.0504	28.5976	72.47	27.91	1799.5	76.05	22.98	2157.4	56690	49737
137.0	6423.830	-80.0349	28.6019	72.48	27.66	1826.5	76.00	22.83	2185.0	58281	50583
138.0	6424.680	-80.0191	28.6062	72.49	27.41	1854.0	75.96	22.69	2213.1	59900	51435
139.0	6425.537	-80.0030	28.6107	72.49	27.17	1881.9	75.92	22.55	2241.5	61546	52293
140.0	6426.399	-79.9867	28.6152	72.50	26.94	1910.1	75.88	22.40	2270.3	63221	53157
141.0	6427.267	-79.9700	28.6198	72.50	26.70	1938.8	75.84	22.26	2299.5	64924	54027
142.0	6428.142	-79.9531	28.6244	72.51	26.47	1967.9	75.79	22.13	2329.1	66656	54902
143.0	6429.022	-79.9359	28.6292	72.51	26.25	1997.4	75.75	21.99	2359.1	68417	55784
144.0	6429.909	-79.9184	28.6340	72.52	26.02	2027.4	75.71	21.85	2389.6	70208	56672
145.0	6430.801	-79.9006	28.6389	72.53	25.81	2057.8	75.68	21.72	2420.5	72029	57566
146.0	6431.700	-79.8825	28.6438	72.54	25.59	2088.7	75.64	21.59	2451.8	73881	58467
147.0	6432.605	-79.8641	28.6489	72.54	25.38	2120.0	75.60	21.46	2483.6	75763	59374
148.0	6433.518	-79.8454	28.6540	72.55	25.18	2151.7	75.57	21.34	2515.8	77676	60288
149.0	6434.437	-79.8264	28.6593	72.56	24.98	2184.0	75.54	21.22	2548.4	79621	61208
150.0	6435.362	-79.8071	28.6646	72.57	24.79	2216.7	75.51	21.10	2581.6	81598	62136
151.0	6436.295	-79.7875	28.6699	72.58	24.60	2250.0	75.47	20.99	2615.2	83608	63070
152.0	6437.241	-79.7674	28.6754	72.59	24.43	2283.7	75.44	20.88	2649.3	85662	64018
153.0	6438.189	-79.7471	28.6810	72.60	24.26	2317.9	75.41	20.78	2683.9	87738	64968
S-IC OUTBOARD ENGINE CUTOFF											
153.820	6438.971	-79.7302	28.6856	72.61	24.12	2346.3	75.39	20.70	2712.6	89463	65751
154.0	6439.143	-79.7265	28.6866	72.61	24.09	2351.5	75.38	20.68	2717.9	89844	65924
S-IC/S-II SEPARATION COMMAND											
154.470	6439.590	-79.7168	28.6893	72.61	24.00	2355.3	75.38	20.60	2721.9	90837	66371
156.0	6441.042	-79.6850	28.6980	72.63	23.71	2350.7	75.40	20.35	2718.1	94086	67826
158.0	6442.914	-79.6433	28.7093	72.66	23.34	2347.3	75.42	20.02	2715.7	98342	69702
160.0	6444.764	-79.6015	28.7208	72.69	22.98	2351.7	75.43	19.72	2721.1	102620	71556
162.0	6446.588	-79.5595	28.7322	72.72	22.62	2358.6	75.44	19.42	2728.8	106912	73383
164.0	6448.392	-79.5172	28.7437	72.75	22.27	2366.6	75.46	19.12	2737.7	111228	75191
166.0	6450.175	-79.4747	28.7552	72.77	21.92	2375.0	75.47	18.83	2747.1	115570	76977
168.0	6451.939	-79.4319	28.7668	72.80	21.58	2383.8	75.48	18.54	2756.7	119937	78744
170.0	6453.682	-79.3889	28.7784	72.83	21.24	2392.9	75.49	18.26	2766.6	124329	80491
172.0	6455.406	-79.3456	28.7900	72.86	20.90	2402.1	75.50	17.98	2776.6	128747	82219
174.0	6457.110	-79.3020	28.8018	72.89	20.57	2411.5	75.51	17.70	2786.8	133191	83927
176.0	6458.794	-79.2582	28.8135	72.92	20.24	2421.1	75.52	17.42	2797.1	137661	85615
178.0	6460.460	-79.2141	28.8254	72.95	19.91	2430.8	75.54	17.15	2807.6	142157	87284

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
180.0	6462.106	-79.1697	28.8372	72.98	19.59	2440.7	75.55	16.88	2818.3	146679	88935
182.0	6463.734	-79.1250	28.8491	73.01	19.28	2450.8	75.56	16.62	2829.1	151228	90566
184.0	6465.343	-79.0801	28.8611	73.04	18.96	2461.0	75.57	16.36	2840.0	155803	92178
186.0	6466.933	-79.0349	28.8731	73.07	18.65	2471.5	75.59	16.10	2851.1	160405	93772
188.0	6468.505	-78.9895	28.8852	73.10	18.35	2482.1	75.60	15.84	2862.4	165034	95348
190.0	6470.058	-78.9437	28.8973	73.13	18.05	2493.0	75.61	15.59	2873.9	169690	96905
192.0	6471.594	-78.8977	28.9095	73.16	17.75	2504.0	75.63	15.34	2885.6	174374	98445
194.0	6473.112	-78.8514	28.9217	73.19	17.46	2515.2	75.64	15.10	2897.4	179085	99967
196.0	6474.612	-78.8048	28.9340	73.22	17.17	2526.6	75.65	14.85	2909.4	183823	101471
198.0	6476.095	-78.7579	28.9463	73.25	16.88	2538.1	75.67	14.61	2921.4	188589	102958
200.0	6477.561	-78.7107	28.9587	73.29	16.60	2549.7	75.68	14.38	2933.7	193383	104427
202.0	6479.009	-78.6632	28.9711	73.32	16.32	2561.5	75.70	14.14	2946.0	198206	105879
204.0	6480.439	-78.6155	28.9835	73.35	16.04	2573.5	75.71	13.91	2958.6	203056	107314
206.0	6481.853	-78.5674	28.9961	73.38	15.77	2585.7	75.73	13.68	2971.2	207935	108731
208.0	6483.249	-78.5191	29.0086	73.41	15.49	2598.0	75.74	13.45	2984.0	212843	110132
210.0	6484.629	-78.4705	29.0213	73.44	15.23	2610.4	75.75	13.22	2996.9	217780	111516
212.0	6485.991	-78.4215	29.0340	73.47	14.96	2623.0	75.77	13.00	3010.0	222745	112882
214.0	6487.337	-78.3723	29.0467	73.50	14.70	2635.7	75.79	12.78	3023.2	227739	114232
216.0	6488.666	-78.3227	29.0595	73.53	14.44	2648.6	75.80	12.56	3036.5	232763	115565
218.0	6489.979	-78.2729	29.0723	73.57	14.18	2661.6	75.82	12.35	3050.0	237816	116882
220.0	6491.275	-78.2227	29.0852	73.60	13.93	2674.7	75.83	12.13	3063.6	242899	118182
222.0	6492.554	-78.1723	29.0981	73.63	13.68	2688.1	75.85	11.92	3077.3	248012	119465
224.0	6493.817	-78.1215	29.1111	73.66	13.43	2701.5	75.87	11.71	3091.2	253154	120733
226.0	6495.064	-78.0704	29.1241	73.70	13.19	2715.2	75.88	11.51	3105.3	258327	121984
228.0	6496.295	-78.0190	29.1372	73.73	12.95	2728.9	75.90	11.30	3119.4	263530	123219
230.0	6497.510	-77.9673	29.1504	73.76	12.71	2742.8	75.92	11.10	3133.7	268763	124438
232.0	6498.709	-77.9152	29.1635	73.79	12.47	2756.9	75.93	10.90	3148.2	274028	125641
234.0	6499.892	-77.8629	29.1768	73.83	12.24	2771.1	75.95	10.71	3162.7	279323	126928
236.0	6501.059	-77.8102	29.1901	73.86	12.01	2785.5	75.97	10.51	3177.4	284649	127999
238.0	6502.211	-77.7572	29.2034	73.89	11.79	2799.9	75.99	10.32	3192.3	290006	129155
240.0	6503.347	-77.7039	29.2168	73.93	11.56	2814.6	76.01	10.13	3207.2	295395	130296
242.0	6504.467	-77.6502	29.2303	73.96	11.34	2829.4	76.02	9.94	3222.4	300815	131420
244.0	6505.572	-77.5962	29.2438	73.99	11.12	2844.3	76.04	9.76	3237.6	306267	132530
246.0	6506.662	-77.5419	29.2573	74.03	10.91	2859.4	76.06	9.58	3253.0	311751	133624
248.0	6507.737	-77.4872	29.2709	74.06	10.70	2874.7	76.08	9.40	3268.6	317267	134703
250.0	6508.796	-77.4322	29.2846	74.09	10.49	2890.0	76.10	9.22	3284.2	322816	135767
252.0	6509.841	-77.3769	29.2983	74.13	10.28	2905.6	76.12	9.04	3300.1	328397	136816
254.0	6510.871	-77.3212	29.3121	74.16	10.08	2921.2	76.14	8.87	3316.0	334011	137850
256.0	6511.886	-77.2652	29.3259	74.20	9.88	2937.0	76.16	8.70	3332.1	339658	138870
258.0	6512.886	-77.2088	29.3398	74.23	9.68	2953.0	76.18	8.53	3348.3	345338	139875
260.0	6513.872	-77.1521	29.3537	74.27	9.48	2969.1	76.20	8.36	3364.7	351052	140865
262.0	6514.843	-77.0950	29.3676	74.30	9.29	2985.4	76.22	8.20	3381.2	356799	141841
264.0	6515.800	-77.0376	29.3817	74.34	9.10	3001.8	76.24	8.03	3397.8	362580	142802

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
266.0	6516.743	-76.9798	29.3957	74.37	8.92	3018.3	76.26	7.87	3414.6	368395	143749
268.0	6517.672	-76.9217	29.4099	74.41	8.73	3035.0	76.29	7.72	3431.5	374245	144683
270.0	6518.586	-76.8632	29.4240	74.45	8.55	3051.9	76.31	7.56	3448.6	380128	145602
272.0	6519.487	-76.8043	29.4383	74.48	8.37	3068.9	76.33	7.41	3465.8	386047	146507
274.0	6520.373	-76.7451	29.4525	74.52	8.20	3086.0	76.35	7.26	3483.2	392000	147398
276.0	6521.246	-76.6855	29.4669	74.56	8.02	3103.4	76.37	7.11	3500.7	397989	148276
278.0	6522.106	-76.6255	29.4813	74.59	7.85	3120.8	76.40	6.96	3518.4	404013	149139
280.0	6522.952	-76.5652	29.4957	74.63	7.68	3138.5	76.42	6.81	3536.2	410072	149990
282.0	6523.784	-76.5045	29.5102	74.67	7.52	3156.2	76.44	6.67	3554.1	416168	150827
284.0	6524.603	-76.4434	29.5247	74.70	7.35	3174.1	76.47	6.53	3572.2	422299	151651
286.0	6525.409	-76.3819	29.5393	74.74	7.19	3192.2	76.49	6.39	3590.4	428467	152461
288.0	6526.202	-76.3200	29.5539	74.78	7.03	3210.4	76.52	6.25	3608.8	434672	153259
290.0	6526.982	-76.2577	29.5686	74.82	6.88	3228.7	76.54	6.12	3627.3	440913	154043
292.0	6527.748	-76.1951	29.5834	74.86	6.72	3247.2	76.57	5.99	3645.9	447191	154815
294.0	6528.502	-76.1321	29.5982	74.89	6.57	3265.9	76.59	5.85	3664.7	453506	155574
296.0	6529.244	-76.0686	29.6130	74.93	6.42	3284.7	76.62	5.73	3683.7	459859	156320
298.0	6529.973	-76.0048	29.6279	74.97	6.28	3303.6	76.64	5.60	3702.8	466250	157054
300.0	6530.689	-75.9406	29.6429	75.01	6.14	3322.7	76.67	5.48	3722.0	472679	157775
302.0	6531.393	-75.8759	29.6579	75.05	5.99	3342.0	76.69	5.35	3741.5	479145	158484
304.0	6532.085	-75.8109	29.6729	75.09	5.86	3361.5	76.72	5.23	3761.0	485651	159181
306.0	6532.765	-75.7455	29.6880	75.13	5.72	3381.1	76.75	5.11	3780.7	492195	159865
308.0	6533.433	-75.6796	29.7032	75.17	5.58	3400.8	76.77	5.00	3800.6	498779	160538
310.0	6534.089	-75.6133	29.7184	75.21	5.45	3420.7	76.80	4.88	3820.7	505401	161199
312.0	6534.733	-75.5466	29.7336	75.25	5.32	3440.8	76.83	4.77	3840.8	512063	161848
314.0	6535.366	-75.4795	29.7489	75.29	5.20	3461.0	76.86	4.66	3861.1	518766	162486
316.0	6535.987	-75.4119	29.7643	75.33	5.07	3481.4	76.88	4.55	3881.6	525508	163112
318.0	6536.597	-75.3440	29.7797	75.37	4.95	3501.9	76.91	4.44	3902.2	532290	163726
320.0	6537.195	-75.2756	29.7951	75.42	4.83	3522.6	76.94	4.33	3923.0	539113	164330
322.0	6537.782	-75.2067	29.8106	75.46	4.71	3543.4	76.97	4.23	3944.0	545978	164922
324.0	6538.358	-75.1375	29.8262	75.50	4.59	3564.5	77.00	4.13	3965.1	552883	165503
326.0	6538.924	-75.0677	29.8418	75.54	4.48	3585.7	77.03	4.03	3986.4	559830	166073
328.0	6539.478	-74.9976	29.8574	75.58	4.37	3607.0	77.06	3.93	4007.8	566819	166633
330.0	6540.022	-74.9270	29.8731	75.63	4.26	3628.5	77.09	3.83	4029.4	573849	167182
332.0	6540.555	-74.8559	29.8889	75.67	4.15	3650.2	77.12	3.74	4051.2	580923	167720
334.0	6541.078	-74.7844	29.9047	75.71	4.04	3672.1	77.15	3.64	4073.1	588039	168248
336.0	6541.590	-74.7124	29.9205	75.76	3.94	3694.1	77.18	3.55	4095.2	595197	168766
338.0	6542.093	-74.6400	29.9364	75.80	3.84	3716.3	77.21	3.46	4117.5	602400	169273
340.0	6542.585	-74.5671	29.9524	75.84	3.74	3738.7	77.24	3.37	4140.0	609646	169771
342.0	6543.067	-74.4938	29.9684	75.89	3.64	3761.2	77.28	3.29	4162.6	616935	170258
344.0	6543.540	-74.4199	29.9844	75.93	3.54	3783.9	77.31	3.20	4185.3	624269	170736
346.0	6544.003	-74.3456	30.0005	75.98	3.45	3806.8	77.34	3.12	4208.3	631648	171204
348.0	6544.456	-74.2708	30.0166	76.02	3.36	3829.9	77.37	3.04	4231.4	639071	171663
350.0	6544.901	-74.1956	30.0328	76.07	3.27	3853.2	77.41	2.96	4254.8	646540	172112

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
352.0	6545.335	-74.1198	30.0490	76.11	3.18	3876.6	77.44	2.88	4278.2	654054	172552
354.0	6545.761	-74.0435	30.0653	76.16	3.10	3900.2	77.48	2.81	4301.9	661614	172983
356.0	6546.178	-73.9668	30.0816	76.20	3.01	3924.0	77.51	2.73	4325.7	669220	173405
358.0	6546.586	-73.8896	30.0980	76.25	2.93	3948.0	77.54	2.66	4349.8	676873	173819
360.0	6546.985	-73.8118	30.1144	76.30	2.85	3972.1	77.58	2.59	4374.0	684573	174223
362.0	6547.376	-73.7336	30.1309	76.34	2.77	3996.5	77.62	2.52	4398.4	692320	174619
364.0	6547.758	-73.6548	30.1474	76.39	2.70	4021.0	77.65	2.45	4422.9	700114	175007
366.0	6548.132	-73.5756	30.1639	76.44	2.62	4045.7	77.69	2.38	4447.7	707956	175386
368.0	6548.498	-73.4958	30.1805	76.49	2.55	4070.6	77.72	2.32	4472.6	715847	175758
370.0	6548.856	-73.4155	30.1972	76.53	2.48	4095.7	77.76	2.26	4497.8	723786	176121
372.0	6549.206	-73.3346	30.2139	76.58	2.41	4121.0	77.80	2.19	4523.1	731774	176477
374.0	6549.549	-73.2533	30.2306	76.63	2.34	4146.4	77.83	2.13	4548.6	739811	176825
376.0	6549.884	-73.1714	30.2474	76.68	2.28	4172.1	77.87	2.08	4574.3	747898	177165
378.0	6550.211	-73.0890	30.2642	76.73	2.21	4198.0	77.91	2.02	4600.2	756035	177498
380.0	6550.532	-73.0060	30.2810	76.78	2.15	4224.1	77.95	1.96	4626.3	764222	177825
382.0	6550.846	-72.9225	30.2979	76.83	2.09	4250.4	77.99	1.91	4652.7	772461	178144
384.0	6551.152	-72.8384	30.3149	76.88	2.03	4276.9	78.02	1.86	4679.2	780751	178456
386.0	6551.452	-72.7538	30.3319	76.93	1.98	4303.6	78.06	1.81	4706.0	789092	178761
388.0	6551.746	-72.6686	30.3489	76.98	1.92	4330.5	78.10	1.76	4732.9	797485	179060
390.0	6552.033	-72.5828	30.3659	77.03	1.87	4357.7	78.14	1.71	4760.1	805931	179353
392.0	6552.314	-72.4965	30.3831	77.08	1.82	4385.0	78.18	1.66	4787.5	814430	179640
394.0	6552.589	-72.4096	30.4002	77.13	1.77	4412.6	78.22	1.62	4815.1	822981	179920
396.0	6552.858	-72.3221	30.4174	77.18	1.72	4440.4	78.26	1.58	4842.9	831587	180195
398.0	6553.121	-72.2341	30.4346	77.23	1.67	4468.5	78.31	1.53	4871.0	840247	180464
400.0	6553.379	-72.1454	30.4519	77.29	1.63	4496.8	78.35	1.49	4899.3	848961	180728
402.0	6553.632	-72.0562	30.4692	77.34	1.58	4525.3	78.39	1.45	4927.9	857731	180986
404.0	6553.880	-71.9663	30.4866	77.39	1.54	4554.0	78.43	1.42	4956.6	866556	181239
406.0	6554.122	-71.8759	30.5039	77.45	1.50	4583.0	78.47	1.38	4985.5	875436	181488
408.0	6554.360	-71.7848	30.5214	77.50	1.46	4612.2	78.52	1.35	5014.8	884373	181731
410.0	6554.594	-71.6932	30.5388	77.55	1.43	4641.6	78.56	1.31	5044.2	893367	181970
412.0	6554.823	-71.6009	30.5563	77.61	1.39	4671.3	78.61	1.28	5073.9	902418	182205
414.0	6555.048	-71.5080	30.5738	77.66	1.36	4701.2	78.65	1.25	5103.9	911527	182436
416.0	6555.269	-71.4144	30.5914	77.72	1.33	4731.4	78.69	1.22	5134.1	920694	182663
418.0	6555.486	-71.3203	30.6090	77.77	1.30	4761.8	78.74	1.19	5164.5	929920	182886
420.0	6555.700	-71.2254	30.6267	77.83	1.27	4792.5	78.78	1.17	5195.2	939205	183105
422.0	6555.910	-71.1300	30.6443	77.88	1.24	4823.5	78.83	1.14	5226.2	948550	183321
424.0	6556.117	-71.0338	30.6620	77.94	1.21	4854.7	78.88	1.12	5257.5	957955	183534
426.0	6556.321	-70.9371	30.6798	78.00	1.19	4886.2	78.92	1.10	5289.0	967421	183744
428.0	6556.523	-70.8396	30.6975	78.06	1.17	4918.0	78.97	1.08	5320.8	976948	183952
430.0	6556.723	-70.7415	30.7153	78.11	1.15	4950.0	79.02	1.06	5352.9	986536	184157
432.0	6556.920	-70.6427	30.7331	78.17	1.13	4982.4	79.07	1.04	5385.2	996188	184360
434.0	6557.115	-70.5432	30.7510	78.23	1.11	5014.9	79.12	1.03	5417.7	1005902	184561
436.0	6557.308	-70.4431	30.7689	78.29	1.09	5047.8	79.16	1.01	5450.7	1015679	184761

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
438.0	6557.500	-70.3422	30.7368	78.35	1.08	5081.0	79.21	1.00	5483.9	1025521	184958
440.0	6557.691	-70.2406	30.8047	78.41	1.06	5114.5	79.26	0.99	5517.4	1035426	185155
442.0	6557.880	-70.1383	30.8227	78.47	1.05	5148.2	79.31	0.98	5551.1	1045398	185350
444.0	6558.069	-70.0354	30.8407	78.53	1.04	5182.3	79.36	0.97	5585.2	1055434	185545
446.0	6558.258	-69.9316	30.8587	78.59	1.03	5216.3	79.42	0.96	5619.2	1065537	185740
448.0	6558.444	-69.8273	30.8767	78.65	1.01	5244.9	79.47	0.94	5647.9	1075700	185932
450.0	6558.627	-69.7223	30.8948	78.71	0.98	5272.2	79.52	0.91	5675.1	1085917	186120
452.0	6558.805	-69.6168	30.9128	78.77	0.95	5299.5	79.57	0.89	5702.5	1096187	186305
454.0	6558.980	-69.5106	30.9308	78.83	0.93	5326.9	79.63	0.86	5729.9	1106510	186485
456.0	6559.150	-69.4039	30.9488	78.89	0.90	5354.6	79.68	0.84	5757.6	1116886	186661
458.0	6559.316	-69.2966	30.9668	78.96	0.87	5382.3	79.74	0.81	5785.3	1127316	186833
460.0	6559.478	-69.1886	30.9848	79.02	0.85	5410.2	79.79	0.79	5813.2	1137799	187001
462.0	6559.636	-69.0801	31.0028	79.08	0.82	5438.2	79.85	0.77	5841.3	1148337	187165
464.0	6559.791	-68.9710	31.0208	79.15	0.80	5466.5	79.90	0.75	5869.5	1158929	187326
466.0	6559.942	-68.8613	31.0387	79.21	0.78	5494.9	79.96	0.73	5897.9	1169576	187483
468.0	6560.090	-68.7509	31.0567	79.28	0.76	5523.5	80.01	0.71	5926.6	1180278	187638
470.0	6560.236	-68.6399	31.0746	79.34	0.74	5552.4	80.07	0.69	5955.5	1191035	187789
472.0	6560.378	-68.5283	31.0926	79.41	0.72	5581.5	80.13	0.68	5984.6	1201849	187937
474.0	6560.518	-68.4161	31.1105	79.47	0.71	5610.8	80.19	0.66	6013.9	1212720	188083
476.0	6560.656	-68.3033	31.1284	79.54	0.69	5640.3	80.24	0.65	6043.4	1223647	188227
478.0	6560.791	-68.1898	31.1462	79.61	0.68	5670.0	80.30	0.63	6073.1	1234631	188368
480.0	6560.925	-68.0756	31.1641	79.67	0.67	5699.9	80.36	0.62	6103.0	1245674	188507
482.0	6561.056	-67.9609	31.1819	79.74	0.66	5730.0	80.42	0.61	6133.2	1256774	188645
484.0	6561.187	-67.8454	31.1997	79.81	0.65	5760.3	80.48	0.60	6163.5	1267933	188782
486.0	6561.316	-67.7293	31.2175	79.88	0.64	5790.7	80.54	0.59	6193.9	1279150	188917
488.0	6561.444	-67.6126	31.2352	79.95	0.63	5821.4	80.60	0.59	6224.6	1290427	189051
490.0	6561.571	-67.4952	31.2530	80.02	0.62	5852.3	80.67	0.58	6255.5	1301763	189184
492.0	6561.698	-67.3771	31.2707	80.09	0.61	5883.4	80.73	0.57	6286.6	1313159	189316
494.0	6561.824	-67.2584	31.2883	80.16	0.61	5914.8	80.79	0.57	6318.0	1324615	189448
496.0	6561.950	-67.1389	31.3060	80.23	0.61	5946.5	80.85	0.57	6349.7	1336133	189579
498.0	6562.075	-67.0188	31.3236	80.30	0.60	5978.6	80.92	0.56	6381.8	1347712	189711
500.0	6562.201	-66.8980	31.3412	80.37	0.60	6010.9	80.98	0.56	6414.1	1359354	189843
502.0	6562.327	-66.7765	31.3587	80.44	0.60	6043.3	81.04	0.56	6446.6	1371058	189975
504.0	6562.454	-66.6543	31.3762	80.51	0.60	6075.8	81.11	0.56	6479.1	1382825	190107
506.0	6562.582	-66.5314	31.3937	80.59	0.60	6108.5	81.17	0.57	6511.8	1394655	190241
508.0	6562.711	-66.4077	31.4111	80.66	0.61	6141.6	81.24	0.57	6544.9	1406549	190376
510.0	6562.842	-66.2834	31.4285	80.73	0.61	6175.0	81.30	0.57	6578.3	1418507	190513
512.0	6562.975	-66.1583	31.4458	80.80	0.62	6208.8	81.37	0.58	6612.1	1430530	190651
514.0	6563.109	-66.0325	31.4631	80.88	0.62	6242.7	81.44	0.58	6646.0	1442619	190791
516.0	6563.246	-65.9060	31.4804	80.95	0.63	6277.0	81.50	0.59	6680.3	1454774	190934
518.0	6563.385	-65.7787	31.4976	81.03	0.64	6311.6	81.57	0.60	6714.9	1466995	191079
520.0	6563.529	-65.6506	31.5147	81.10	0.65	6346.5	81.64	0.62	6749.8	1479283	191228
522.0	6563.676	-65.5218	31.5318	81.18	0.67	6381.6	81.71	0.63	6785.0	1491646	191382

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
524.0	6563.827	-65.3923	31.5489	81.25	0.69	6417.1	81.78	0.65	6820.5	1504069	191538
S-II ENGINE CUTOFF											
524.040	6563.830	-65.3897	31.5492	81.26	0.69	6417.8	81.78	0.65	6821.1	1504318	191541
S-II/S-IVB SEPARATION COMMAND											
524.900	6563.895	-65.3338	31.5565	81.29	0.68	6421.6	81.81	0.64	6825.0	1509675	191608
526.0	6563.976	-65.2623	31.5658	81.33	0.65	6421.6	81.85	0.62	6825.0	1516525	191692
528.0	6564.118	-65.1322	31.5826	81.41	0.62	6421.7	81.92	0.58	6825.1	1528992	191840
530.0	6564.253	-65.0021	31.5993	81.49	0.58	6424.7	81.99	0.55	6828.1	1541462	191980
532.0	6564.381	-64.8717	31.6158	81.56	0.56	6434.0	82.07	0.53	6837.4	1553944	192114
534.0	6564.505	-64.7411	31.6322	81.64	0.54	6444.3	82.14	0.51	6847.8	1566444	192243
536.0	6564.625	-64.6103	31.6485	81.72	0.52	6455.1	82.21	0.49	6858.6	1578965	192369
538.0	6564.740	-64.4791	31.6647	81.80	0.50	6466.0	82.28	0.47	6869.5	1591506	192490
540.0	6564.851	-64.3477	31.6807	81.87	0.48	6477.1	82.35	0.45	6880.6	1604069	192605
542.0	6564.955	-64.2161	31.6966	81.95	0.45	6488.3	82.43	0.42	6891.8	1616653	192715
544.0	6565.054	-64.0841	31.7124	82.03	0.42	6499.6	82.50	0.39	6903.2	1629258	192819
546.0	6565.145	-63.9519	31.7281	82.11	0.39	6511.0	82.57	0.37	6914.6	1641886	192916
548.0	6565.231	-63.8194	31.7436	82.19	0.36	6522.4	82.64	0.34	6926.0	1654536	193006
550.0	6565.309	-63.6867	31.7590	82.27	0.33	6533.8	82.72	0.31	6937.4	1667207	193090
552.0	6565.382	-63.5536	31.7743	82.34	0.30	6545.3	82.79	0.29	6948.9	1679901	193168
554.0	6565.448	-63.4203	31.7895	82.42	0.28	6556.8	82.86	0.26	6960.4	1692617	193240
556.0	6565.509	-63.2867	31.8045	82.50	0.25	6568.3	82.94	0.24	6971.9	1705355	193305
558.0	6565.563	-63.1528	31.8194	82.58	0.22	6579.8	83.01	0.21	6983.4	1718115	193365
560.0	6565.612	-63.0186	31.8341	82.66	0.20	6591.3	83.09	0.19	6994.9	1730898	193418
562.0	6565.655	-62.8842	31.8488	82.74	0.17	6602.9	83.16	0.16	7006.5	1743703	193466
564.0	6565.692	-62.7495	31.8632	82.82	0.15	6614.5	83.24	0.14	7018.1	1756530	193508
566.0	6565.723	-62.6144	31.8776	82.90	0.12	6626.1	83.31	0.12	7029.7	1769380	193544
568.0	6565.750	-62.4792	31.8918	82.98	0.10	6637.8	83.39	0.10	7041.4	1782252	193575
570.0	6565.771	-62.3436	31.9059	83.06	0.08	6649.5	83.46	0.07	7053.1	1795147	193601
572.0	6565.786	-62.2077	31.9198	83.15	0.06	6661.3	83.54	0.05	7064.9	1808065	193621
574.0	6565.797	-62.0716	31.9336	83.23	0.04	6673.1	83.61	0.03	7076.7	1821006	193637
576.0	6565.803	-61.9352	31.9473	83.31	0.02	6684.9	83.69	0.02	7088.6	1833969	193648
578.0	6565.805	-61.7984	31.9608	83.39	-0.00	6696.8	83.77	-0.00	7100.5	1846956	193653
580.0	6565.802	-61.6615	31.9742	83.47	-0.02	6708.8	83.84	-0.02	7112.4	1859965	193655
582.0	6565.794	-61.5242	31.9875	83.55	-0.04	6720.7	83.92	-0.04	7124.4	1872998	193652
584.0	6565.782	-61.3866	32.0006	83.64	-0.06	6732.7	84.00	-0.06	7136.4	1886054	193644
586.0	6565.766	-61.2487	32.0135	83.72	-0.08	6744.8	84.07	-0.07	7148.4	1899134	193632
588.0	6565.746	-61.1106	32.0263	83.80	-0.09	6756.8	84.15	-0.09	7160.4	1912236	193617
590.0	6565.722	-60.9722	32.0390	83.88	-0.11	6768.9	84.23	-0.10	7172.6	1925363	193597
592.0	6565.694	-60.8334	32.0515	83.97	-0.12	6781.1	84.31	-0.12	7184.7	1938513	193573

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
594.0	6565.663	-60.6944	32.0639	84.05	-0.14	6793.3	84.38	-0.13	7197.0	1951686	193546
596.0	6565.629	-60.5551	32.0761	84.13	-0.15	6805.6	84.46	-0.14	7209.3	1964884	193516
598.0	6565.591	-60.4155	32.0881	84.22	-0.17	6818.0	84.54	-0.16	7221.6	1978105	193482
600.0	6565.550	-60.2756	32.1001	84.30	-0.18	6830.4	84.62	-0.17	7234.0	1991351	193445
602.0	6565.506	-60.1354	32.1118	84.38	-0.19	6842.8	84.70	-0.18	7246.5	2004620	193405
604.0	6565.459	-59.9950	32.1234	84.47	-0.20	6855.3	84.77	-0.19	7258.9	2017914	193362
606.0	6565.409	-59.8542	32.1349	84.55	-0.21	6867.7	84.85	-0.20	7271.4	2031232	193317
608.0	6565.357	-59.7131	32.1462	84.63	-0.22	6880.2	84.93	-0.21	7283.9	2044575	193268
610.0	6565.302	-59.5718	32.1574	84.72	-0.23	6892.8	85.01	-0.22	7296.4	2057942	193217
612.0	6565.246	-59.4301	32.1684	84.80	-0.24	6905.3	85.09	-0.23	7308.9	2071333	193164
614.0	6565.187	-59.2881	32.1792	84.89	-0.25	6917.8	85.17	-0.23	7321.5	2084749	193109
616.0	6565.126	-59.1459	32.1899	84.97	-0.25	6930.4	85.25	-0.24	7334.0	2098189	193052
618.0	6565.064	-59.0033	32.2004	85.06	-0.26	6943.0	85.33	-0.25	7346.6	2111653	192993
620.0	6565.000	-58.8605	32.2108	85.14	-0.27	6955.6	85.41	-0.25	7359.3	2125143	192933
622.0	6564.935	-58.7174	32.2210	85.23	-0.27	6968.3	85.49	-0.25	7371.9	2138657	192872
624.0	6564.869	-58.5739	32.2310	85.31	-0.27	6981.0	85.57	-0.26	7384.7	2152195	192809
626.0	6564.803	-58.4302	32.2409	85.40	-0.28	6993.8	85.65	-0.26	7397.4	2165759	192746
628.0	6564.735	-58.2862	32.2506	85.48	-0.28	7006.6	85.73	-0.26	7410.2	2179348	192681
630.0	6564.667	-58.1419	32.2601	85.57	-0.28	7019.4	85.81	-0.26	7423.0	2192961	192616
632.0	6564.599	-57.9973	32.2695	85.66	-0.28	7032.2	85.89	-0.26	7435.9	2206600	192551
634.0	6564.530	-57.8523	32.2787	85.74	-0.28	7045.2	85.97	-0.26	7448.8	2220263	192486
636.0	6564.461	-57.7071	32.2878	85.83	-0.28	7058.2	86.05	-0.26	7461.8	2233952	192420
638.0	6564.393	-57.5616	32.2967	85.92	-0.28	7071.3	86.14	-0.26	7474.9	2247667	192355
640.0	6564.325	-57.4158	32.3054	86.00	-0.27	7084.4	86.22	-0.26	7488.0	2261407	192290
642.0	6564.257	-57.2697	32.3139	86.09	-0.27	7097.6	86.30	-0.26	7501.2	2275173	192225
644.0	6564.190	-57.1232	32.3223	86.18	-0.27	7110.8	86.38	-0.25	7514.4	2288964	192161
646.0	6564.124	-56.9765	32.3305	86.26	-0.26	7124.0	86.46	-0.25	7527.6	2302781	192097
648.0	6564.059	-56.8295	32.3385	86.35	-0.26	7137.2	86.55	-0.25	7540.8	2316624	192035
650.0	6563.995	-56.6822	32.3463	86.44	-0.25	7150.4	86.63	-0.24	7554.0	2330493	191973
652.0	6563.932	-56.5345	32.3540	86.53	-0.25	7163.6	86.71	-0.24	7567.2	2344388	191913
654.0	6563.871	-56.3866	32.3615	86.61	-0.24	7176.9	86.79	-0.23	7580.6	2358308	191854
656.0	6563.811	-56.2384	32.3688	86.70	-0.23	7190.3	86.88	-0.22	7593.9	2372255	191798
658.0	6563.755	-56.0898	32.3759	86.79	-0.22	7203.7	86.96	-0.21	7607.3	2386227	191743
660.0	6563.701	-55.9410	32.3829	86.88	-0.21	7217.1	87.04	-0.20	7620.7	2400226	191692
662.0	6563.650	-55.7919	32.3897	86.97	-0.20	7230.6	87.13	-0.18	7634.2	2414251	191643
664.0	6563.602	-55.6424	32.3963	87.05	-0.18	7244.1	87.21	-0.17	7647.7	2428303	191598
666.0	6563.558	-55.4927	32.4027	87.14	-0.17	7257.6	87.29	-0.16	7661.2	2442380	191555
668.0	6563.517	-55.3426	32.4089	87.23	-0.15	7271.2	87.38	-0.15	7674.8	2456484	191517
670.0	6563.480	-55.1923	32.4149	87.32	-0.14	7284.8	87.46	-0.13	7688.4	2470615	191482
672.0	6563.447	-55.0416	32.4208	87.41	-0.12	7298.5	87.55	-0.12	7702.1	2484772	191451
674.0	6563.418	-54.8907	32.4264	87.50	-0.10	7312.2	87.63	-0.10	7715.8	2498956	191424
676.0	6563.393	-54.7394	32.4319	87.59	-0.09	7325.9	87.72	-0.08	7729.5	2513166	191401
678.0	6563.373	-54.5878	32.4372	87.68	-0.07	7339.7	87.80	-0.07	7743.3	2527403	191382

TABLE B-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	RANGE M	ALTITUDE M
680.0	6563.358	-54.4360	32.4423	87.77	-0.05	7353.4	87.89	-0.05	7757.0	2541667	191369
682.0	6563.347	-54.2838	32.4472	87.86	-0.03	7367.2	87.97	-0.03	7770.8	2555958	191360
684.0	6563.342	-54.1313	32.4519	87.95	-0.01	7381.1	88.06	-0.01	7784.7	2570275	191356
	S-IVB FIRST GUIDANCE CUTOFF										
684.980	6563.341	-54.0565	32.4541	87.99	-0.00	7387.8	88.10	-0.00	7791.4	2577301	191356
686.0	6563.340	-53.9786	32.4564	88.04	0.00	7389.6	88.14	0.00	7793.2	2584616	191356
688.0	6563.340	-53.8258	32.4607	88.13	0.00	7389.5	88.23	0.00	7793.1	2598962	191358
690.0	6563.341	-53.6729	32.4648	88.22	0.00	7389.5	88.32	0.00	7793.1	2613308	191360
692.0	6563.341	-53.5201	32.4687	88.32	-0.00	7389.4	88.40	-0.00	7793.0	2627656	191361
694.0	6563.341	-53.3672	32.4724	88.41	-0.00	7389.4	88.49	-0.00	7793.0	2642002	191362
	PARKING ORBIT INSERTION										
694.980	6563.337	-53.2923	32.4741	88.45	0.00	7389.2	88.53	0.00	7792.8	2649033	191359

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
PARKING ORBIT INSERTION								
694.980	6563.337	-53.2923	32.4741	32.6487	88.53	0.00	7792.8	191.359
700.0	6563.338	-52.9086	32.4822	32.6568	88.75	0.00	7792.8	191.362
750.0	6563.339	-49.0845	32.4920	32.6666	90.92	-0.00	7793.1	191.367
800.0	6563.338	-45.2652	32.3730	32.5472	93.09	-0.00	7793.3	191.325
850.0	6563.335	-41.4620	32.1261	32.2996	95.23	-0.00	7793.6	191.240
900.0	6563.332	-37.6859	31.7532	31.9256	97.35	-0.00	7793.8	191.111
950.0	6563.328	-33.9470	31.2571	31.4281	99.42	-0.00	7794.0	190.942
1000.0	6563.324	-30.2542	30.6415	30.8105	101.43	-0.00	7794.2	190.734
1050.0	6563.318	-26.6152	29.9107	30.0773	103.37	-0.00	7794.4	190.491
1100.0	6563.312	-23.0365	29.0696	29.2333	105.24	-0.00	7794.6	190.214
1150.0	6563.303	-19.5228	28.1238	28.2840	107.03	-0.00	7794.8	189.908
1200.0	6563.293	-16.0775	27.0789	27.2352	108.73	-0.00	7795.1	189.577
1250.0	6563.280	-12.7027	25.9412	26.0929	110.33	-0.00	7795.3	189.223
1300.0	6563.264	-9.3990	24.7168	24.8633	111.84	-0.00	7795.6	188.853
1350.0	6563.245	-6.1659	23.4120	23.5527	113.25	-0.00	7795.9	188.470
1400.0	6563.223	-3.0018	22.0331	22.1673	114.55	-0.00	7796.1	188.080
1450.0	6563.197	0.0956	20.5863	20.7133	115.76	-0.00	7796.4	187.687
1500.0	6563.168	3.1297	19.0777	19.1969	116.86	-0.00	7796.7	187.297
1550.0	6563.135	6.1041	17.5132	17.6239	117.87	-0.01	7797.0	186.915
1600.0	6563.098	9.0234	15.8986	16.0003	118.77	-0.01	7797.3	186.545
1650.0	6563.058	11.8923	14.2396	14.3317	119.57	-0.01	7797.5	186.192
1700.0	6563.014	14.7157	12.5416	12.6235	120.28	-0.01	7797.8	185.861
1750.0	6562.967	17.4991	10.8099	10.8810	120.88	-0.01	7798.0	185.557
1800.0	6562.916	20.2480	9.0496	9.1096	121.39	-0.01	7798.3	185.282
1850.0	6562.863	22.9679	7.2657	7.3141	121.81	-0.01	7798.5	185.040
1900.0	6562.806	25.6645	5.4630	5.4996	122.14	-0.01	7798.7	184.835
1950.0	6562.747	28.3438	3.6463	3.6708	122.37	-0.01	7798.9	184.668
2000.0	6562.686	31.0114	1.8204	1.8326	122.50	-0.01	7799.1	184.542
2050.0	6562.623	33.6733	-0.0102	-0.0103	122.55	-0.01	7799.2	184.457
2100.0	6562.559	36.3353	-1.8408	-1.8532	122.50	-0.01	7799.3	184.416
2150.0	6562.495	39.0032	-3.6668	-3.6914	122.36	-0.01	7799.4	184.417
2200.0	6562.430	41.6830	-5.4836	-5.5203	122.13	-0.01	7799.5	184.460
2250.0	6562.365	44.3804	-7.2864	-7.3350	121.81	-0.01	7799.5	184.545
2300.0	6562.302	47.1013	-9.0705	-9.1306	121.39	-0.01	7799.5	184.670
2350.0	6562.241	49.8514	-10.8310	-10.9022	120.88	-0.01	7799.5	184.834
2400.0	6562.183	52.6362	-12.5629	-12.6448	120.27	-0.01	7799.5	185.034
2450.0	6562.129	55.4613	-14.2611	-14.3532	119.56	-0.01	7799.5	185.267
2500.0	6562.080	58.3320	-15.9202	-16.0220	118.76	-0.01	7799.4	185.530
2550.0	6562.036	61.2534	-17.5349	-17.6457	117.85	-0.01	7799.3	185.821
2600.0	6562.000	64.2303	-19.0994	-19.2187	116.85	-0.00	7799.2	186.134

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
2650.0	6561.971	67.2669	-20.6080	-20.7350	115.74	-0.00	7799.1	186.467
2700.0	6561.951	70.3671	-22.0546	-22.1888	114.53	-0.00	7799.0	186.814
2750.0	6561.942	73.5341	-23.4332	-23.5739	113.23	-0.00	7798.8	187.173
2800.0	6561.943	76.7704	-24.7375	-24.8841	111.82	0.00	7798.7	187.538
2850.0	6561.956	80.0774	-25.9612	-26.1130	110.31	0.00	7798.5	187.905
2900.0	6561.981	83.4557	-27.0981	-27.2545	108.70	0.00	7798.3	188.271
2950.0	6562.020	86.9045	-28.1419	-28.3022	107.00	0.01	7798.1	188.631
3000.0	6562.072	90.4217	-29.0864	-29.2502	105.21	0.01	7798.0	188.980
3050.0	6562.139	94.0040	-29.9259	-30.0926	103.34	0.01	7797.8	189.316
3100.0	6562.221	97.6464	-30.6549	-30.8240	101.39	0.01	7797.6	189.636
3150.0	6562.317	101.3426	-31.2685	-31.4395	99.37	0.02	7797.4	189.935
3200.0	6562.429	105.0847	-31.7623	-31.9348	97.30	0.02	7797.2	190.211
3250.0	6562.557	108.8638	-32.1327	-32.3063	95.19	0.02	7797.0	190.463
3300.0	6562.700	112.6696	-32.3769	-32.5512	93.04	0.02	7796.8	190.689
3350.0	6562.858	116.4914	-32.4931	-32.6677	90.87	0.02	7796.7	190.886
3400.0	6563.031	120.3175	-32.4803	-32.6549	88.70	0.03	7796.5	191.055
3450.0	6563.219	124.1366	-32.3387	-32.5129	86.53	0.03	7796.4	191.195
3500.0	6563.421	127.9372	-32.0694	-32.2428	84.39	0.03	7796.2	191.306
3550.0	6563.637	131.7086	-31.6745	-31.8467	82.28	0.03	7796.1	191.389
3600.0	6563.865	135.4408	-31.1570	-31.3276	80.22	0.03	7795.9	191.445
3650.0	6564.105	139.1251	-30.5206	-30.6892	78.22	0.04	7795.8	191.476
3700.0	6564.356	142.7540	-29.7699	-29.9360	76.29	0.04	7795.7	191.483
3750.0	6564.617	146.3214	-28.9100	-29.0731	74.44	0.04	7795.5	191.469
3800.0	6564.886	149.8227	-27.9463	-28.1059	72.66	0.04	7795.4	191.436
3850.0	6565.163	153.2549	-26.8849	-27.0404	70.98	0.04	7795.3	191.388
3900.0	6565.446	156.6161	-25.7318	-25.8826	69.40	0.04	7795.2	191.328
3950.0	6565.733	159.9059	-24.4933	-24.6388	67.91	0.04	7795.1	191.259
4000.0	6566.023	163.1251	-23.1758	-23.3153	66.52	0.04	7795.0	191.184
4050.0	6566.315	166.2753	-21.7854	-21.9183	65.23	0.04	7794.8	191.108
4100.0	6566.608	169.3592	-20.3284	-20.4540	64.04	0.04	7794.7	191.035
4150.0	6566.899	172.3800	-18.8109	-18.9286	62.96	0.04	7794.6	190.967
4200.0	6567.187	175.3418	-17.2387	-17.3479	61.97	0.04	7794.5	190.909
4250.0	6567.472	178.2490	-15.6178	-15.7178	61.09	0.04	7794.4	190.863
4300.0	6567.751	-178.8936	-13.9536	-14.0439	60.30	0.04	7794.2	190.835
4350.0	6568.023	-176.0809	-12.2515	-12.3316	59.62	0.04	7794.1	190.825
4400.0	6568.287	-173.3076	-10.5169	-10.5862	59.02	0.04	7794.0	190.838
4450.0	6568.543	-170.5681	-8.7547	-8.8128	58.53	0.04	7793.8	190.875
4500.0	6568.788	-167.8568	-6.9700	-7.0165	58.13	0.04	7793.6	190.938
4550.0	6569.021	-165.1679	-5.1676	-5.2022	57.82	0.03	7793.5	191.030
4600.0	6569.243	-162.4958	-3.3522	-3.3747	57.61	0.03	7793.3	191.150
4650.0	6569.451	-159.8345	-1.5284	-1.5387	57.48	0.03	7793.1	191.301
4700.0	6569.646	-157.1783	0.2991	0.3011	57.45	0.03	7792.9	191.481
4750.0	6569.827	-154.5212	2.1258	2.1401	57.51	0.03	7792.7	191.691

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
4800.0	6565.994	-151.8576	3.9470	3.9735	57.67	0.02	7792.5	191.929
4850.0	6570.145	-149.1815	5.7581	5.7967	57.91	0.02	7792.3	192.195
4900.0	6570.281	-146.4871	7.5546	7.6049	58.25	0.02	7792.0	192.487
4950.0	6570.403	-143.7686	9.3316	9.3933	58.68	0.02	7791.8	192.802
5000.0	6570.509	-141.0205	11.0842	11.1570	59.21	0.01	7791.6	193.137
5050.0	6570.600	-138.2372	12.8076	12.8910	59.83	0.01	7791.3	193.490
5100.0	6570.676	-135.4130	14.4966	14.5901	60.55	0.01	7791.1	193.857
5150.0	6570.738	-132.5429	16.1459	16.2489	61.36	0.01	7790.9	194.234
5200.0	6570.787	-129.6218	17.7501	17.8621	62.28	0.01	7790.7	194.618
5250.0	6570.821	-126.6450	19.3035	19.4239	63.29	0.00	7790.5	195.003
5300.0	6570.843	-123.6083	20.8005	20.9286	64.41	0.00	7790.3	195.387
5350.0	6570.853	-120.5078	22.2351	22.3702	65.63	0.00	7790.1	195.763
5400.0	6570.852	-117.3405	23.6012	23.7427	66.95	-0.00	7789.9	196.129
5450.0	6570.840	-114.1042	24.8925	25.0398	68.37	-0.00	7789.7	196.479
5500.0	6570.818	-110.7972	26.1030	26.2553	69.88	-0.00	7789.6	196.809
5550.0	6570.787	-107.4194	27.2262	27.3831	71.50	-0.01	7789.4	197.116
5600.0	6570.748	-103.9715	28.2561	28.4169	73.20	-0.01	7789.3	197.394
5650.0	6570.701	-100.4557	29.1866	29.3507	75.00	-0.01	7789.2	197.641
5700.0	6570.648	-96.8756	30.0120	30.1789	76.88	-0.01	7789.2	197.853
5750.0	6570.589	-93.2361	30.7269	30.8962	78.83	-0.01	7789.1	198.027
5800.0	6570.524	-89.5437	31.3264	31.4976	80.84	-0.01	7789.1	198.161
5850.0	6570.455	-85.8062	31.8063	31.9789	82.92	-0.01	7789.2	198.252
5900.0	6570.382	-82.0328	32.1630	32.3367	85.03	-0.01	7789.2	198.299
5950.0	6570.306	-78.2335	32.3939	32.5682	87.18	-0.01	7789.3	198.301
6000.0	6570.227	-74.4192	32.4972	32.6718	89.34	-0.01	7789.4	198.257
6050.0	6570.146	-70.6014	32.4720	32.6465	91.51	-0.01	7789.5	198.167
6100.0	6570.063	-66.7914	32.3186	32.4927	93.67	-0.01	7789.6	198.032
6150.0	6569.978	-63.0005	32.0380	32.2113	95.80	-0.01	7789.8	197.853
6200.0	6569.893	-59.2393	31.6326	31.8047	97.90	-0.01	7790.0	197.631
6250.0	6569.806	-55.5176	31.1052	31.2757	99.95	-0.01	7790.2	197.369
6300.0	6569.718	-51.8440	30.4597	30.6281	101.95	-0.01	7790.5	197.069
6350.0	6569.630	-48.2259	29.7005	29.8664	103.87	-0.01	7790.8	196.735
6400.0	6569.541	-44.6691	28.8328	28.9956	105.72	-0.01	7791.0	196.369
6450.0	6569.451	-41.1781	27.8620	28.0213	107.48	-0.01	7791.3	195.975
6500.0	6569.361	-37.7559	26.7941	26.9493	109.15	-0.01	7791.6	195.559
6550.0	6569.270	-34.4042	25.6351	25.7855	110.73	-0.01	7792.0	195.124
6600.0	6569.178	-31.1233	24.3913	24.5363	112.21	-0.01	7792.3	194.675
6650.0	6569.085	-27.9125	23.0688	23.2079	113.59	-0.01	7792.6	194.217
6700.0	6568.991	-24.7699	21.6740	21.8064	114.87	-0.01	7793.0	193.755
6750.0	6568.895	-21.6930	20.2129	20.3380	116.05	-0.01	7793.3	193.294
6800.0	6568.798	-18.6783	18.6917	18.8088	117.12	-0.01	7793.7	192.839
6850.0	6568.700	-15.7220	17.1162	17.2247	118.10	-0.01	7794.0	192.395
6900.0	6568.600	-12.8195	15.4921	15.5915	118.98	-0.01	7794.3	191.967

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
6950.0	6568.498	-9.9660	13.8251	13.9146	119.75	-0.02	7794.6	191.559
7000.0	6568.394	-7.1565	12.1204	12.1996	120.43	-0.02	7794.9	191.176
7050.0	6568.289	-4.3856	10.3833	10.4517	121.02	-0.02	7795.2	190.821
7100.0	6568.182	-1.6478	8.6188	8.6760	121.50	-0.02	7795.5	190.499
7150.0	6568.074	1.0625	6.8320	6.8776	121.90	-0.02	7795.8	190.213
7200.0	6567.965	3.7512	5.0276	5.0613	122.20	-0.02	7796.0	189.964
7250.0	6567.855	6.4238	3.2104	3.2320	122.41	-0.02	7796.2	189.756
7300.0	6567.744	9.0863	1.3850	1.3943	122.52	-0.02	7796.4	189.591
7350.0	6567.634	11.7445	-0.4439	-0.4469	122.55	-0.02	7796.6	189.469
7400.0	6567.523	14.4042	-2.2718	-2.2871	122.48	-0.02	7796.7	189.391
7450.0	6567.414	17.0713	-4.0941	-4.1216	122.32	-0.02	7796.8	189.358
7500.0	6567.307	19.7515	-5.9060	-5.9456	122.06	-0.02	7796.9	189.368
7550.0	6567.202	22.4508	-7.7030	-7.7543	121.72	-0.02	7797.0	189.422
7600.0	6567.100	25.1748	-9.4802	-9.5429	121.28	-0.01	7797.0	189.517
7650.0	6567.002	27.9293	-11.2326	-11.3064	120.74	-0.01	7797.0	189.651
7700.0	6566.909	30.7197	-12.9554	-13.0398	120.11	-0.01	7797.0	189.823
7750.0	6566.822	33.5517	-14.6434	-14.7378	119.39	-0.01	7797.0	190.029
7800.0	6566.742	36.4303	-16.2912	-16.3951	118.56	-0.01	7796.9	190.267
7850.0	6566.669	39.3606	-17.8933	-18.0061	117.63	-0.01	7796.8	190.532
7900.0	6566.606	42.3473	-19.4441	-19.5652	116.61	-0.01	7796.7	190.821
7950.0	6566.552	45.3946	-20.9378	-21.0665	115.48	-0.01	7796.6	191.129
8000.0	6566.509	48.5061	-22.3683	-22.5040	114.25	-0.01	7796.5	191.454
8050.0	6566.477	51.6850	-23.7295	-23.8716	112.92	-0.00	7796.4	191.790
8100.0	6566.458	54.9334	-25.0152	-25.1630	111.49	-0.00	7796.2	192.133
8150.0	6566.452	58.2526	-26.2191	-26.3719	109.96	0.00	7796.0	192.478
8200.0	6566.461	61.6429	-27.3349	-27.4922	108.33	0.00	7795.9	192.823
8250.0	6566.484	65.1032	-28.3565	-28.5176	106.62	0.00	7795.7	193.161
8300.0	6566.522	68.6312	-29.2778	-29.4422	104.81	0.01	7795.5	193.491
8350.0	6566.576	72.2233	-30.0930	-30.2602	102.92	0.01	7795.3	193.808
8400.0	6566.647	75.8741	-30.7968	-30.9663	100.96	0.01	7795.1	194.108
8450.0	6566.734	79.5770	-31.3845	-31.5558	98.93	0.01	7794.9	194.390
8500.0	6566.837	83.3239	-31.8517	-32.0244	96.86	0.02	7794.8	194.649
8550.0	6566.958	87.1057	-32.1951	-32.3689	94.73	0.02	7794.6	194.885
8600.0	6567.095	90.9119	-32.4121	-32.5865	92.58	0.02	7794.4	195.096
8650.0	6567.248	94.7317	-32.5011	-32.6757	90.41	0.02	7794.2	195.279
8700.0	6567.417	98.5534	-32.4612	-32.6358	88.24	0.03	7794.0	195.435
8750.0	6567.602	102.3656	-32.2930	-32.4670	86.09	0.03	7793.9	195.563
8800.0	6567.802	106.1571	-31.9977	-32.1709	83.95	0.03	7793.7	195.663
8850.0	6568.016	109.9173	-31.5775	-31.7495	81.85	0.03	7793.6	195.736
8900.0	6568.243	113.6365	-31.0357	-31.2060	79.81	0.03	7793.4	195.783
8950.0	6568.482	117.3062	-30.3762	-30.5443	77.82	0.04	7793.3	195.806
9000.0	6568.733	120.9193	-29.6035	-29.7691	75.91	0.04	7793.1	195.806
9050.0	6568.994	124.4699	-28.7229	-28.8854	74.07	0.04	7793.0	195.787

TABLE B-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE KM
9100.0	6569.263	127.9538	-27.7400	-27.8989	72.32	0.04	7792.9	195.750
9150.0	6569.541	131.3683	-26.6607	-26.8154	70.66	0.04	7792.8	195.698
9200.0	6569.824	134.7117	-25.4912	-25.6410	69.09	0.04	7792.6	195.636
9250.0	6570.111	137.9840	-24.2377	-24.3821	67.62	0.04	7792.5	195.565
9300.0	6570.402	141.1860	-22.9065	-23.0448	66.25	0.04	7792.4	195.490
9350.0	6570.694	144.3196	-21.5039	-21.6355	64.99	0.04	7792.3	195.415
9400.0	6570.987	147.3876	-20.0360	-20.1602	63.82	0.04	7792.1	195.343
9450.0	6571.278	150.3934	-18.5089	-18.6250	62.76	0.04	7792.0	195.277
9500.0	6571.566	153.3411	-16.9284	-17.0359	61.79	0.04	7791.9	195.222
9550.0	6571.849	156.2352	-15.3003	-15.3985	60.93	0.04	7791.7	195.179
9600.0	6572.126	159.0806	-13.6301	-13.7185	60.16	0.04	7791.6	195.154
9650.0	6572.397	161.8823	-11.9231	-12.0011	59.50	0.04	7791.4	195.148
	INITIATE S-IVB RESTART SEQUENCE							
9659.540	6572.447	162.4124	-11.5937	-11.6697	59.38	0.04	7791.4	195.149

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
	INITIATE S-IVB RESTART SEQUENCE								
9659.540	-9570472	-2005644	-5381566	6419.4	-1969.2	-3089.4	4.03	2.31	6.90
9660.0	-9567519	-2006550	-5382987	6421.2	-1968.2	-3086.2	4.03	2.31	6.90
9670.0	-9503107	-2026116	-5413503	6461.1	-1945.0	-3017.0	3.95	2.34	6.94
9680.0	-9438300	-2045448	-5443325	6500.1	-1921.4	-2947.4	3.86	2.37	6.98
9690.0	-9373107	-2064543	-5472450	6538.3	-1897.6	-2877.5	3.78	2.40	7.01
9700.0	-9307536	-2083398	-5500874	6575.8	-1873.4	-2807.2	3.70	2.43	7.04
9710.0	-9241595	-2102011	-5528593	6612.3	-1849.0	-2736.6	3.62	2.46	7.08
9720.0	-9175292	-2120377	-5555605	6648.1	-1824.2	-2665.7	3.53	2.49	7.11
9730.0	-9108636	-2138494	-5581907	6683.0	-1799.2	-2594.5	3.45	2.52	7.14
9740.0	-9041635	-2156360	-5607494	6717.0	-1773.9	-2523.0	3.36	2.55	7.17
9750.0	-8974298	-2173971	-5632365	6750.3	-1748.3	-2451.1	3.28	2.58	7.20
9760.0	-8906633	-2191324	-5656516	6782.6	-1722.4	-2379.0	3.19	2.60	7.22
9770.0	-8838648	-2208417	-5679945	6814.2	-1696.2	-2306.7	3.11	2.63	7.25
9780.0	-8770352	-2225247	-5702648	6844.8	-1669.7	-2234.0	3.02	2.66	7.28
9790.0	-8701754	-2241811	-5724624	6874.6	-1643.0	-2161.1	2.94	2.69	7.30
9800.0	-8632863	-2258105	-5745870	6903.6	-1616.0	-2088.0	2.85	2.71	7.33
9810.0	-8563686	-2274129	-5766383	6931.6	-1588.7	-2014.6	2.76	2.74	7.35
9820.0	-8494233	-2289878	-5786161	6958.8	-1561.1	-1941.0	2.68	2.77	7.37
9830.0	-8424513	-2305351	-5805202	6985.1	-1533.3	-1867.1	2.59	2.79	7.39
9840.0	-8354534	-2320544	-5823503	7010.6	-1505.3	-1793.1	2.50	2.82	7.41
9850.0	-8284304	-2335455	-5841063	7035.1	-1476.9	-1718.9	2.41	2.84	7.43
9860.0	-8213834	-2350082	-5857880	7058.8	-1448.4	-1644.5	2.32	2.87	7.45
9870.0	-8143131	-2364422	-5873952	7081.6	-1419.5	-1569.9	2.23	2.89	7.47
9880.0	-8072205	-2378472	-5889276	7103.5	-1390.5	-1495.1	2.14	2.92	7.49
9890.0	-8001064	-2392230	-5903853	7124.5	-1361.2	-1420.1	2.06	2.94	7.50
9900.0	-7929718	-2405694	-5917679	7144.6	-1331.6	-1345.1	1.97	2.97	7.52
9910.0	-7858175	-2418862	-5930753	7163.8	-1301.8	-1269.8	1.88	2.99	7.53
9920.0	-7786445	-2431730	-5943075	7182.1	-1271.8	-1194.5	1.79	3.01	7.54
9930.0	-7714537	-2444298	-5954642	7199.5	-1241.6	-1119.0	1.69	3.04	7.55
9940.0	-7642458	-2456561	-5965454	7216.0	-1211.1	-1043.4	1.60	3.06	7.56
9950.0	-7570220	-2468519	-5975510	7231.6	-1180.4	-967.7	1.51	3.08	7.57
9960.0	-7497830	-2480170	-5984808	7246.3	-1149.5	-891.9	1.42	3.10	7.58
9970.0	-7425298	-2491510	-5993348	7260.0	-1118.4	-816.0	1.33	3.12	7.59
9980.0	-7352633	-2502538	-6001129	7272.9	-1087.1	-740.1	1.24	3.14	7.60
9990.0	-7279843	-2513252	-6008150	7284.8	-1055.6	-664.1	1.15	3.16	7.60
10000.0	-7206940	-2523649	-6014410	7295.8	-1023.9	-588.0	1.06	3.18	7.61
10010.0	-7133930	-2533729	-6019910	7305.9	-992.0	-511.9	0.96	3.20	7.61
10020.0	-7060824	-2543488	-6024648	7315.1	-959.9	-435.8	0.87	3.22	7.62
10030.0	-6987631	-2552926	-6028625	7323.4	-927.6	-359.6	0.78	3.24	7.62
10040.0	-6914360	-2562040	-6031840	7330.7	-895.1	-283.4	0.69	3.26	7.62

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
10050.0	-6841020	-2570828	-6034293	7337.1	-862.5	-207.2	0.60	3.27	7.62
10060.0	-6767621	-2579289	-6035984	7342.6	-829.6	-131.0	0.50	3.29	7.62
10070.0	-6694171	-2587420	-6036913	7347.2	-796.7	-54.8	0.41	3.31	7.62
10080.0	-6620680	-2595221	-6037081	7350.8	-763.5	21.3	0.32	3.32	7.61
10090.0	-6547158	-2602690	-6036487	7353.5	-730.2	97.4	0.23	3.34	7.61
10100.0	-6473613	-2609824	-6035133	7355.3	-696.7	173.5	0.13	3.36	7.61
10110.0	-6400054	-2616623	-6033017	7356.2	-663.1	249.5	0.04	3.37	7.60
10120.0	-6326492	-2623085	-6030142	7356.1	-629.3	325.5	-0.05	3.39	7.59
10130.0	-6252934	-2629208	-6026508	7355.2	-595.4	401.4	-0.14	3.40	7.59
10140.0	-6179391	-2634992	-6022115	7353.3	-561.3	477.2	-0.24	3.41	7.58
10150.0	-6105872	-2640434	-6016964	7350.4	-527.1	552.9	-0.33	3.43	7.57
10160.0	-6032386	-2645533	-6011057	7346.7	-492.8	628.5	-0.42	3.44	7.56
10170.0	-5958942	-2650289	-6004394	7342.0	-458.3	704.0	-0.51	3.45	7.55
10180.0	-5885549	-2654699	-5996977	7336.4	-423.7	779.4	-0.61	3.46	7.53
10190.0	-5812217	-2658763	-5988806	7329.9	-389.1	854.7	-0.70	3.47	7.52
10200.0	-5738955	-2662480	-5979883	7322.4	-354.2	929.8	-0.79	3.49	7.51
10210.0	-5665772	-2665848	-5970210	7314.1	-319.3	1004.8	-0.88	3.50	7.49
10220.0	-5592676	-2668866	-5959788	7304.8	-284.3	1079.6	-0.97	3.51	7.47
S-IVB RESTART COMMAND									
10229.510	-5523253	-2671412	-5949183	7295.2	-250.9	1150.6	-1.06	3.52	7.46
10230.0	-5519678	-2671534	-5948618	7294.7	-249.2	1154.3	-1.06	3.52	7.46
10232.0	-5505091	-2672025	-5946295	7292.5	-242.2	1169.2	-1.08	3.52	7.46
10234.0	-5490508	-2672503	-5943941	7290.3	-235.1	1184.1	-1.09	3.52	7.45
10236.0	-5475931	-2672966	-5941558	7288.1	-228.1	1199.0	-1.11	3.52	7.45
10238.0	-5461357	-2673415	-5939146	7286.5	-221.1	1213.9	0.14	3.51	7.46
10240.0	-5446780	-2673850	-5936702	7290.4	-214.1	1229.8	4.39	3.48	8.32
10242.0	-5432191	-2674272	-5934226	7299.4	-207.1	1246.4	4.67	3.45	8.34
10244.0	-5417583	-2674680	-5931716	7309.9	-200.3	1263.1	5.82	3.43	8.36
10246.0	-5402953	-2675073	-5929173	7321.5	-193.1	1279.9	5.82	3.72	8.38
10248.0	-5388299	-2675452	-5926597	7333.2	-185.4	1296.7	5.82	4.01	8.40
10250.0	-5373622	-2675815	-5923987	7344.8	-177.2	1313.5	5.82	4.08	8.42
10252.0	-5358922	-2676162	-5921343	7356.4	-169.2	1330.4	5.82	3.88	8.47
10254.0	-5344199	-2676494	-5918664	7368.0	-161.8	1347.9	5.82	3.55	8.85
10256.0	-5329452	-2676811	-5915951	7379.7	-154.8	1365.6	5.84	3.41	8.85
10258.0	-5314682	-2677114	-5913202	7390.9	-148.0	1383.3	5.88	3.44	8.84
10260.0	-5299888	-2677404	-5910418	7402.7	-141.1	1400.9	5.90	3.47	8.84
10262.0	-5285071	-2677680	-5907599	7414.5	-134.1	1418.6	5.90	3.49	8.84
10264.0	-5270230	-2677941	-5904744	7426.3	-127.1	1436.3	5.91	3.49	8.83
10266.0	-5255365	-2678189	-5901854	7438.2	-120.1	1454.0	5.92	3.49	8.83
10268.0	-5240477	-2678423	-5898928	7450.0	-113.1	1471.6	5.93	3.53	8.83
10270.0	-5225565	-2678642	-5895967	7461.9	-106.0	1489.3	5.94	3.57	8.82

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
10272.0	-5210630	-2678847	-5892971	7473.8	-98.8	1506.9	5.94	3.61	8.82
10274.0	-5195670	-2679038	-5889940	7485.7	-91.6	1524.5	5.93	3.64	8.82
10276.0	-5180687	-2679214	-5886873	7497.5	-84.3	1542.1	5.90	3.66	8.81
10278.0	-5165680	-2679376	-5883771	7509.3	-77.1	1559.8	5.90	3.69	8.81
10280.0	-5150650	-2679523	-5880634	7521.1	-69.7	1577.4	5.93	3.73	8.81
10282.0	-5135596	-2679655	-5877462	7533.0	-62.2	1595.0	5.96	3.77	8.80
10284.0	-5120518	-2679772	-5874254	7544.9	-54.6	1612.6	5.97	3.81	8.79
10286.0	-5105416	-2679873	-5871012	7556.9	-47.0	1630.1	5.96	3.84	8.78
10288.0	-5090290	-2679959	-5867734	7568.8	-39.3	1647.7	5.94	3.85	8.79
10290.0	-5075141	-2680030	-5864421	7580.7	-31.6	1665.3	5.95	3.86	8.79
10292.0	-5059968	-2680086	-5861073	7592.6	-23.8	1682.9	5.96	3.88	8.80
10294.0	-5044771	-2680126	-5857689	7604.5	-16.1	1700.5	5.96	3.91	8.79
10296.0	-5029550	-2680150	-5854271	7616.4	-8.2	1718.0	5.97	3.94	8.79
10298.0	-5014305	-2680158	-5850817	7628.3	-0.3	1735.6	5.97	3.97	8.78
10300.0	-4999036	-2680151	-5847328	7640.3	7.7	1753.2	5.98	4.00	8.78
10302.0	-4983744	-2680128	-5843804	7652.2	15.7	1770.7	5.99	4.02	8.78
10304.0	-4968427	-2680088	-5840245	7664.2	23.7	1788.3	6.01	4.03	8.78
10306.0	-4953087	-2680033	-5836651	7676.3	31.8	1805.8	6.04	4.06	8.79
10308.0	-4937722	-2679961	-5833022	7688.4	40.0	1823.4	6.07	4.08	8.79
10310.0	-4922333	-2679873	-5829358	7700.6	48.1	1841.0	6.09	4.09	8.80
10312.0	-4906920	-2679768	-5825658	7712.7	56.3	1858.6	6.09	4.11	8.80
10314.0	-4891482	-2679647	-5821923	7724.9	64.6	1876.2	6.08	4.12	8.80
10316.0	-4876020	-2679510	-5818153	7737.1	72.8	1893.8	6.06	4.12	8.81
10318.0	-4860534	-2679356	-5814348	7749.2	81.1	1911.5	6.05	4.14	8.81
10320.0	-4845024	-2679186	-5810507	7761.3	89.4	1929.1	6.06	4.17	8.81
10322.0	-4829489	-2678999	-5806631	7773.4	97.8	1946.7	6.08	4.21	8.79
10324.0	-4813930	-2678795	-5802721	7785.6	106.2	1964.2	6.10	4.26	8.78
10326.0	-4798346	-2678574	-5798774	7797.8	114.8	1981.8	6.11	4.29	8.78
10328.0	-4782739	-2678336	-5794793	7810.1	123.4	1999.4	6.13	4.32	8.78
10330.0	-4767106	-2678080	-5790777	7822.3	132.0	2016.9	6.14	4.33	8.78
10332.0	-4751449	-2677807	-5786726	7834.6	140.7	2034.5	6.15	4.34	8.78
10334.0	-4735768	-2677517	-5782639	7846.9	149.4	2052.1	6.16	4.36	8.78
10336.0	-4720062	-2677210	-5778517	7859.3	158.2	2069.6	6.19	4.39	8.79
10338.0	-4704331	-2676885	-5774360	7871.7	167.0	2087.2	6.23	4.41	8.80
10340.0	-4688575	-2676542	-5770168	7884.2	175.8	2104.8	6.27	4.43	8.81
10342.0	-4672794	-2676181	-5765941	7896.7	184.7	2122.4	6.29	4.45	8.81
10344.0	-4656988	-2675803	-5761679	7909.3	193.6	2140.1	6.31	4.45	8.81
10346.0	-4641156	-2675407	-5757381	7922.0	202.5	2157.7	6.32	4.46	8.82
10348.0	-4625300	-2674993	-5753048	7934.6	211.4	2175.4	6.31	4.47	8.83
10350.0	-4609418	-2674562	-5748679	7947.2	220.3	2193.0	6.30	4.48	8.82
10352.0	-4593511	-2674112	-5744276	7959.8	229.3	2210.6	6.29	4.51	8.82
10354.0	-4577579	-2673644	-5739837	7972.4	238.4	2228.3	6.31	4.54	8.82
10356.0	-4561621	-2673158	-5735363	7985.1	247.5	2245.9	6.34	4.59	8.81

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
10358.0	-4545639	-2672654	-5730853	7997.8	256.7	2263.5	6.36	4.63	8.80
10360.0	-4529630	-2672131	-5726309	8010.5	266.0	2281.1	6.38	4.67	8.79
10362.0	-4513596	-2671590	-5721729	8023.3	275.4	2298.7	6.40	4.69	8.79
10364.0	-4497537	-2671030	-5717114	8036.1	284.8	2316.2	6.40	4.70	8.79
10366.0	-4481452	-2670451	-5712464	8048.9	294.2	2333.8	6.38	4.71	8.79
10368.0	-4465342	-2669853	-5707779	8061.6	303.6	2351.4	6.37	4.72	8.79
10370.0	-4449206	-2669236	-5703058	8074.4	313.1	2369.0	6.39	4.75	8.79
10372.0	-4433044	-2668601	-5698303	8087.2	322.6	2386.5	6.44	4.79	8.78
10374.0	-4416857	-2667946	-5693512	8100.1	332.3	2404.1	6.49	4.84	8.77
10376.0	-4400643	-2667272	-5688686	8113.2	342.0	2421.6	6.53	4.88	8.77
10378.0	-4384404	-2666578	-5683826	8126.2	351.8	2439.2	6.55	4.91	8.77
10380.0	-4368138	-2665864	-5678930	8139.3	361.6	2456.7	6.56	4.92	8.78
10382.0	-4351847	-2665131	-5673999	8152.5	371.4	2474.3	6.59	4.92	8.79
10384.0	-4335528	-2664379	-5669033	8165.7	381.3	2491.9	6.61	4.93	8.80
10386.0	-4319184	-2663606	-5664031	8178.9	391.2	2509.5	6.63	4.94	8.81
10388.0	-4302813	-2662814	-5658995	8192.2	401.1	2527.1	6.64	4.96	8.81
10390.0	-4286415	-2662002	-5653923	8205.5	411.0	2544.7	6.66	4.99	8.80
10392.0	-4269991	-2661170	-5648816	8218.8	421.0	2562.3	6.68	5.03	8.80
10394.0	-4253540	-2660318	-5643674	8232.2	431.1	2579.9	6.70	5.06	8.80
10396.0	-4237062	-2659445	-5638496	8245.6	441.3	2597.5	6.70	5.09	8.79
10398.0	-4220557	-2658553	-5633284	8259.0	451.5	2615.1	6.69	5.10	8.79
10400.0	-4204026	-2657639	-5628036	8272.4	461.7	2632.6	6.68	5.13	8.77
10402.0	-4187468	-2656706	-5622753	8285.8	472.0	2650.2	6.70	5.18	8.76
10404.0	-4170883	-2655751	-5617435	8299.2	482.4	2667.7	6.74	5.23	8.75
10406.0	-4154271	-2654776	-5612082	8312.7	492.9	2685.2	6.78	5.27	8.74
10408.0	-4137632	-2653780	-5606694	8326.3	503.5	2702.7	6.80	5.31	8.73
10410.0	-4120966	-2652762	-5601272	8339.9	514.1	2720.1	6.79	5.32	8.73
10412.0	-4104272	-2651723	-5595814	8353.5	524.8	2737.6	6.79	5.33	8.74
10414.0	-4087552	-2650663	-5590321	8367.1	535.4	2755.1	6.80	5.35	8.75
10416.0	-4070804	-2649581	-5584794	8380.7	546.2	2772.6	6.84	5.38	8.73
10418.0	-4054029	-2648478	-5579231	8394.4	557.0	2790.0	6.87	5.43	8.71
10420.0	-4037226	-2647353	-5573634	8408.1	567.9	2807.4	6.88	5.48	8.70
10422.0	-4020396	-2646207	-5568001	8421.9	578.9	2824.8	6.90	5.51	8.71
10424.0	-4003538	-2645038	-5562334	8435.8	590.0	2842.3	6.95	5.54	8.72
10426.0	-3986653	-2643847	-5556632	8449.7	601.1	2859.7	6.99	5.57	8.72
10428.0	-3969740	-2642633	-5550895	8463.7	612.2	2877.1	7.01	5.59	8.71
10430.0	-3952798	-2641398	-5545124	8477.8	623.4	2894.6	7.02	5.60	8.72
10432.0	-3935829	-2640140	-5539317	8491.8	634.6	2912.0	7.03	5.62	8.72
10434.0	-3918831	-2638859	-5533476	8505.9	645.9	2929.5	7.05	5.64	8.73
10436.0	-3901805	-2637556	-5527599	8520.0	657.2	2946.9	7.08	5.68	8.73
10438.0	-3884751	-2636230	-5521688	8534.2	668.6	2964.4	7.10	5.71	8.72
10440.0	-3867668	-2634882	-5515742	8548.4	680.1	2981.8	7.13	5.75	8.71
10442.0	-3850557	-2633510	-5509761	8562.7	691.6	2999.2	7.18	5.79	8.70

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
10444.0	-3833417	-2632115	-5503745	8577.1	703.3	3016.6	7.23	5.84	8.71
10446.0	-3816248	-2630697	-5497694	8591.6	715.0	3034.1	7.26	5.88	8.73
10448.0	-3799051	-2629255	-5491609	8606.1	726.7	3051.5	7.25	5.90	8.72
10450.0	-3781824	-2627790	-5485488	8620.6	738.5	3069.0	7.24	5.90	8.70
10452.0	-3764568	-2626301	-5479333	8635.2	750.4	3086.4	7.27	5.92	8.69
10454.0	-3747283	-2624788	-5473143	8649.7	762.3	3103.8	7.32	5.96	8.70
10456.0	-3729969	-2623252	-5466918	8664.4	774.2	3121.2	7.36	6.01	8.71
10458.0	-3712626	-2621691	-5460658	8679.1	786.3	3138.6	7.38	6.05	8.70
10460.0	-3695253	-2620107	-5454364	8693.9	798.4	3156.0	7.41	6.09	8.70
10462.0	-3677850	-2618498	-5448034	8708.8	810.6	3173.4	7.45	6.13	8.71
10464.0	-3660417	-2616864	-5441670	8723.7	822.9	3190.8	7.47	6.15	8.72
10466.0	-3642955	-2615206	-5435271	8738.6	835.2	3208.2	7.48	6.18	8.72
10468.0	-3625463	-2613523	-5428837	8753.7	847.6	3225.7	7.54	6.22	8.72
10470.0	-3607940	-2611815	-5422368	8768.8	860.1	3243.1	7.60	6.27	8.72
10472.0	-3590387	-2610082	-5415864	8784.1	872.7	3260.5	7.65	6.32	8.72
10474.0	-3572804	-2608324	-5409326	8799.4	885.4	3278.0	7.66	6.34	8.73
10476.0	-3555190	-2606541	-5402752	8814.7	898.1	3295.5	7.67	6.36	8.75
10478.0	-3537545	-2604732	-5396144	8830.1	910.8	3313.0	7.72	6.38	8.77
10480.0	-3519869	-2602897	-5389500	8845.6	923.6	3330.6	7.80	6.42	8.78
10482.0	-3502163	-2601037	-5382822	8861.3	936.5	3348.1	7.86	6.47	8.78
10484.0	-3484424	-2599151	-5376108	8877.0	949.5	3365.7	7.91	6.53	8.77
10486.0	-3466654	-2597239	-5369359	8892.9	962.6	3383.2	7.96	6.57	8.79
10488.0	-3448853	-2595301	-5362575	8908.9	975.8	3400.8	8.00	6.59	8.81
10490.0	-3431019	-2593336	-5355756	8924.9	989.0	3418.5	8.03	6.60	8.84
10492.0	-3413153	-2591345	-5348901	8940.9	1002.2	3436.2	8.03	6.62	8.85
10494.0	-3395255	-2589327	-5342011	8957.0	1015.5	3453.9	8.04	6.65	8.86
10496.0	-3377325	-2587283	-5335086	8973.1	1028.8	3471.6	8.06	6.70	8.86
10498.0	-3359363	-2585212	-5328125	8989.3	1042.3	3489.3	8.10	6.76	8.85
10500.0	-3341368	-2583114	-5321129	9005.5	1055.9	3507.0	8.15	6.85	8.84
10502.0	-3323340	-2580988	-5314097	9021.9	1069.7	3524.7	8.20	6.95	8.82
10504.0	-3305280	-2578835	-5307030	9038.4	1083.7	3542.3	8.26	7.02	8.82
10506.0	-3287187	-2576653	-5299928	9055.0	1097.7	3560.0	8.32	7.07	8.85
10508.0	-3269060	-2574444	-5292790	9071.6	1111.9	3577.7	8.37	7.09	8.88
10510.0	-3250900	-2572206	-5285617	9088.4	1126.1	3595.5	8.40	7.10	8.93
10512.0	-3232707	-2569939	-5278408	9105.3	1140.3	3613.4	8.44	7.12	8.96
10514.0	-3214479	-2567644	-5271163	9122.2	1154.6	3631.3	8.50	7.15	8.98
10516.0	-3196218	-2565321	-5263883	9139.3	1168.9	3649.3	8.57	7.20	9.01
10518.0	-3177922	-2562969	-5256566	9156.5	1183.4	3667.4	8.62	7.27	9.03
10520.0	-3159592	-2560587	-5249213	9173.7	1198.0	3685.5	8.65	7.32	9.05
10522.0	-3141227	-2558177	-5241824	9191.1	1212.7	3703.6	8.69	7.38	9.07
10524.0	-3122828	-2555736	-5234399	9208.5	1227.5	3721.8	8.75	7.44	9.10
10526.0	-3104393	-2553267	-5226937	9226.1	1242.4	3739.9	8.80	7.49	9.10
10528.0	-3085923	-2550767	-5219439	9243.7	1257.5	3758.2	8.82	7.59	9.14

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
10530.0	-3067418	-2548236	-5211904	9261.3	1272.9	3776.6	8.81	7.74	9.24
10532.0	-3048878	-2545675	-5204332	9278.9	1288.5	3795.1	8.80	7.89	9.33
10534.0	-3030303	-2543082	-5196723	9296.6	1304.3	3813.8	8.83	7.96	9.37
10536.0	-3011692	-2540458	-5189077	9314.3	1320.3	3832.6	8.92	7.98	9.38
10538.0	-2993045	-2537801	-5181393	9332.2	1336.3	3851.4	9.01	8.00	9.39
10540.0	-2974363	-2535113	-5173671	9350.3	1352.3	3870.2	9.06	8.03	9.40
10542.0	-2955644	-2532392	-5165912	9368.5	1368.4	3889.0	9.11	8.03	9.39
10544.0	-2936889	-2529639	-5158116	9386.7	1384.4	3907.7	9.15	8.04	9.39
10546.0	-2918097	-2526854	-5150281	9405.1	1400.5	3926.5	9.22	8.05	9.40
10548.0	-2899268	-2524037	-5142409	9423.6	1416.6	3945.4	9.31	8.08	9.43
10550.0	-2880403	-2521188	-5134500	9442.3	1432.8	3964.3	9.37	8.11	9.48
10552.0	-2861499	-2518306	-5126552	9461.1	1449.0	3983.3	9.46	8.12	9.54
10554.0	-2842558	-2515392	-5118567	9480.1	1465.3	4002.4	9.56	8.12	9.54
S-IVB SECOND GUIDANCE CUTOFF									
10555.510	-2828233	-2513170	-5112512	9494.6	1477.5	4016.7	9.63	8.12	9.54
10556.0	-2823582	-2512446	-5110544	9495.9	1480.3	4020.4	-4.14	3.21	5.46
10558.0	-2804598	-2509479	-5102492	9487.6	1486.7	4031.3	-4.15	3.20	5.44
10560.0	-2785633	-2506500	-5094419	9479.3	1493.1	4042.2	-4.17	3.20	5.42
10562.0	-2766682	-2503507	-5086324	9471.0	1499.5	4053.0	-4.18	3.20	5.40
10564.0	-2747748	-2500502	-5078207	9462.6	1505.9	4063.8	-4.20	3.18	5.39
TRANSLUNAR INJECTION									
10565.510	-2733465	-2498225	-5072064	9456.2	1510.7	4072.0	-4.21	3.18	5.38
10600.0	-2409882	-2444260	-4928491	9306.1	1617.9	4251.6	-4.48	3.05	5.04
10650.0	-1950321	-2359641	-4709826	9073.8	1765.1	4490.7	-4.79	2.84	4.52
10700.0	-1502728	-2267931	-4479861	8828.1	1901.4	4703.5	-5.02	2.61	3.99
10750.0	-1067654	-2169686	-4239924	8573.7	2026.4	4889.6	-5.15	2.38	3.46
10800.0	-645435	-2065482	-3991341	8314.6	2139.9	5049.4	-5.20	2.15	2.94
10850.0	-236207	-1955890	-3735401	8054.6	2241.9	5184.1	-5.19	1.93	2.45
10900.0	160061	-1841469	-3473332	7796.7	2333.1	5294.9	-5.12	1.72	1.99
10950.0	543544	-1722753	-3206278	7543.6	2413.9	5383.8	-5.00	1.52	1.57
11000.0	914531	-1600239	-2935291	7297.2	2485.1	5452.6	-4.85	1.33	1.19
11050.0	1273401	-1474389	-2661322	7059.1	2547.5	5503.3	-4.67	1.16	0.85
11100.0	1620596	-1345624	-2385225	6830.4	2601.9	5538.0	-4.48	1.01	0.55
11150.0	1956604	-1214324	-2107755	6611.7	2649.0	5558.5	-4.27	0.88	0.28
11200.0	2281941	-1080832	-1829577	6403.5	2689.7	5566.6	-4.06	0.75	0.05
11250.0	2597135	-945451	-1551272	6206.0	2724.6	5563.9	-3.84	0.65	-0.15
11300.0	2902717	-808453	-1273342	6019.0	2754.5	5551.8	-3.63	0.55	-0.33
11350.0	3199214	-670076	-996223	5842.5	2779.9	5531.7	-3.43	0.47	-0.47
11400.0	3487137	-530529	-720285	5676.1	2801.4	5504.7	-3.23	0.39	-0.60

TABLE B-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	DDXE M/S SQ	DDYE M/S SQ	DDZE M/S SQ
11450.0	3766984	-389997	-445846	5519.4	2819.4	5471.9	-3.04	0.33	-0.71
11500.0	4039232	-248642	-173176	5372.1	2834.4	5434.1	-2.86	0.27	-0.80
11550.0	4304338	-106603	97499	5233.6	2846.8	5392.2	-2.68	0.22	-0.88
11600.0	4562735	35996	365988	5103.6	2856.8	5346.8	-2.52	0.18	-0.94
11650.0	4814835	179048	632133	4981.6	2864.9	5298.5	-2.36	0.14	-0.99
11700.0	5061026	322460	895803	4867.2	2871.3	5247.9	-2.22	0.11	-1.03
11750.0	5301673	466151	1156890	4759.9	2876.1	5195.3	-2.08	0.08	-1.07
11800.0	5537123	610052	1415307	4659.2	2879.7	5141.2	-1.95	0.06	-1.10
11850.0	5767698	754100	1670986	4564.8	2882.1	5085.8	-1.83	0.04	-1.12
11900.0	5993703	898244	1923870	4476.3	2883.5	5029.5	-1.71	0.02	-1.13
11950.0	6215423	1042438	2173919	4393.4	2884.1	4972.4	-1.61	0.00	-1.15
12000.0	6433125	1186640	2421100	4315.5	2883.9	4914.8	-1.51	-0.01	-1.16
12050.0	6647058	1330817	2665390	4242.6	2883.1	4856.8	-1.41	-0.02	-1.16
SPACECRAFT SEPARATION SEQUENCE START									
12056.300	6673758	1348980	2695965	4233.7	2882.9	4849.5	-1.40	-0.02	-1.16
S-IVB/CSM PHYSICAL SEPARATION									
12059.300	6686453	1357629	2710508	4229.5	2882.9	4846.0	-1.40	-0.02	-1.16

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
INITIATE S-IVB RESTART SEQUENCE									
9659.540	5205.499	3788.732	-1321.116	-3296.5	5893.6	3886.6	-7.32	-5.33	1.86
9660.0	5203.982	3791.443	-1319.328	-3299.8	5891.1	3887.4	-7.32	-5.33	1.86
9670.0	5170.619	3850.086	-1280.362	-3372.8	5837.4	3905.7	-7.27	-5.41	1.81
9680.0	5136.528	3908.188	-1241.215	-3445.2	5782.9	3923.5	-7.22	-5.49	1.75
9690.0	5101.716	3965.741	-1201.893	-3517.2	5727.5	3940.7	-7.17	-5.57	1.69
9700.0	5066.187	4022.736	-1162.402	-3588.6	5671.4	3957.4	-7.12	-5.65	1.64
9710.0	5029.945	4079.166	-1122.747	-3659.6	5614.4	3973.5	-7.07	-5.73	1.58
9720.0	4992.997	4135.022	-1082.933	-3730.0	5556.7	3989.1	-7.02	-5.81	1.53
9730.0	4955.346	4190.297	-1042.967	-3800.0	5498.2	4004.1	-6.97	-5.89	1.47
9740.0	4916.999	4244.984	-1002.854	-3869.3	5438.9	4018.5	-6.91	-5.97	1.41
9750.0	4877.961	4299.074	-962.599	-3938.2	5378.9	4032.4	-6.86	-6.04	1.36
9760.0	4838.238	4352.559	-922.209	-4006.5	5318.1	4045.6	-6.80	-6.12	1.30
9770.0	4797.834	4405.433	-881.688	-4074.2	5256.5	4058.4	-6.74	-6.19	1.24
9780.0	4756.755	4457.687	-841.043	-4141.4	5194.3	4070.5	-6.69	-6.27	1.19
9790.0	4715.008	4509.316	-800.280	-4207.9	5131.2	4082.1	-6.63	-6.34	1.13
9800.0	4672.599	4560.310	-759.404	-4273.9	5067.5	4093.1	-6.57	-6.41	1.07
9810.0	4629.532	4610.663	-718.420	-4339.3	5003.1	4103.5	-6.51	-6.48	1.01
9820.0	4585.815	4660.369	-677.336	-4404.0	4937.9	4113.3	-6.45	-6.55	0.96
9830.0	4541.454	4709.419	-636.155	-4468.2	4872.1	4122.6	-6.38	-6.62	0.90
9840.0	4496.454	4757.808	-594.885	-4531.7	4805.5	4131.3	-6.32	-6.69	0.84
9850.0	4450.822	4805.528	-553.531	-4594.6	4738.3	4139.4	-6.26	-6.75	0.78
9860.0	4404.564	4852.573	-512.099	-4656.8	4670.5	4146.9	-6.19	-6.82	0.72
9870.0	4357.687	4898.935	-470.595	-4718.4	4602.0	4153.8	-6.12	-6.88	0.66
9880.0	4310.198	4944.610	-429.025	-4779.3	4532.8	4160.2	-6.06	-6.95	0.61
9890.0	4262.103	4989.589	-387.394	-4839.6	4463.0	4165.9	-5.99	-7.01	0.55
9900.0	4213.409	5033.867	-345.708	-4899.1	4392.6	4171.1	-5.92	-7.07	0.49
9910.0	4164.123	5077.438	-303.973	-4958.0	4321.5	4175.7	-5.85	-7.14	0.43
9920.0	4114.251	5120.296	-262.196	-5016.2	4249.9	4179.7	-5.78	-7.19	0.37
9930.0	4063.801	5162.434	-220.381	-5073.7	4177.6	4183.1	-5.71	-7.25	0.31
9940.0	4012.780	5203.846	-178.536	-5130.4	4104.8	4185.9	-5.64	-7.31	0.25
9950.0	3961.195	5244.528	-136.665	-5186.4	4031.4	4188.1	-5.57	-7.37	0.19
9960.0	3909.054	5284.472	-94.775	-5241.8	3957.4	4189.8	-5.49	-7.43	0.13
9970.0	3856.363	5323.674	-52.871	-5296.3	3882.9	4190.8	-5.42	-7.48	0.08
9980.0	3803.130	5362.128	-10.960	-5350.1	3807.8	4191.3	-5.34	-7.53	0.02
9990.0	3749.362	5399.828	30.953	-5403.2	3732.2	4191.2	-5.27	-7.59	-0.04
10000.0	3695.068	5436.770	72.861	-5455.5	3656.1	4190.4	-5.19	-7.64	-0.10
10010.0	3640.254	5472.948	114.759	-5507.1	3579.4	4189.1	-5.12	-7.69	-0.16
10020.0	3584.929	5508.357	156.641	-5557.8	3502.3	4187.2	-5.04	-7.74	-0.22
10030.0	3529.100	5542.992	198.502	-5607.8	3424.6	4184.7	-4.96	-7.79	-0.28
10040.0	3472.775	5576.849	240.334	-5657.0	3346.5	4181.6	-4.88	-7.84	-0.34

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
10050.0	3415.962	5609.921	282.132	-5705.4	3267.9	4177.9	-4.80	-7.88	-0.40
10060.0	3358.669	5642.205	323.891	-5753.0	3188.9	4173.7	-4.72	-7.93	-0.46
10070.0	3300.904	5673.697	365.604	-5799.8	3109.4	4168.8	-4.64	-7.97	-0.51
10080.0	3242.675	5704.392	407.265	-5845.8	3029.5	4163.4	-4.56	-8.01	-0.57
10090.0	3183.991	5734.286	448.870	-5891.0	2949.1	4157.4	-4.47	-8.06	-0.63
10100.0	3124.859	5763.374	490.411	-5935.3	2868.4	4150.8	-4.39	-8.10	-0.69
10110.0	3065.288	5791.652	531.883	-5978.8	2787.2	4143.6	-4.31	-8.14	-0.75
10120.0	3005.286	5819.117	573.280	-6021.4	2705.7	4135.8	-4.22	-8.17	-0.81
10130.0	2944.862	5845.764	614.596	-6063.2	2623.7	4127.4	-4.14	-8.21	-0.87
10140.0	2884.024	5871.591	655.826	-6104.2	2541.4	4118.5	-4.05	-8.25	-0.92
10150.0	2822.781	5896.592	696.964	-6144.3	2458.8	4108.9	-3.97	-8.28	-0.98
10160.0	2761.142	5920.765	738.003	-6183.5	2375.8	4098.8	-3.88	-8.32	-1.04
10170.0	2699.114	5944.107	778.939	-6221.9	2292.5	4088.2	-3.79	-8.35	-1.10
10180.0	2636.707	5966.614	819.765	-6259.4	2208.8	4076.9	-3.71	-8.38	-1.15
10190.0	2573.930	5988.282	860.475	-6296.0	2124.9	4065.1	-3.62	-8.41	-1.21
10200.0	2510.791	6009.110	901.064	-6331.7	2040.6	4052.7	-3.53	-8.44	-1.27
10210.0	2447.299	6029.094	941.527	-6366.5	1956.1	4039.7	-3.44	-8.47	-1.32
10220.0	2383.463	6048.231	981.857	-6400.5	1871.3	4026.2	-3.35	-8.49	-1.38
	S-IVB RESTART COMMAND								
10229.510	2322.444	6065.643	1020.083	-6432.0	1790.4	4012.8	-3.27	-8.52	-1.43
10230.0	2319.292	6066.519	1022.049	-6433.6	1786.2	4012.1	-3.27	-8.52	-1.44
10232.0	2306.418	6070.074	1030.070	-6440.1	1769.2	4009.2	-3.25	-8.53	-1.45
10234.0	2293.532	6073.596	1038.086	-6446.6	1752.1	4006.3	-3.23	-8.53	-1.46
10236.0	2280.634	6077.083	1046.095	-6453.0	1735.0	4003.4	-3.22	-8.54	-1.47
10238.0	2267.721	6080.536	1054.099	-6459.9	1718.2	4000.8	-4.21	-8.08	-0.85
10240.0	2254.789	6083.956	1062.101	-6471.4	1702.5	4001.0	-7.81	-7.34	1.44
10242.0	2241.832	6087.347	1070.106	-6487.2	1687.9	4004.1	-8.02	-7.26	1.60
10244.0	2228.842	6090.708	1078.117	-6504.2	1673.8	4007.8	-8.92	-6.86	2.17
10246.0	2215.817	6094.041	1086.137	-6522.1	1660.0	4012.0	-9.08	-6.91	1.94
10248.0	2202.755	6097.347	1094.164	-6540.5	1646.1	4015.6	-9.24	-6.95	1.70
10250.0	2189.657	6100.625	1102.198	-6559.0	1632.2	4018.9	-9.28	-6.98	1.65
10252.0	2176.521	6103.875	1110.240	-6577.5	1618.2	4022.3	-9.18	-7.01	1.83
10254.0	2163.349	6107.096	1118.289	-6595.8	1603.7	4026.4	-9.10	-7.34	2.20
10256.0	2150.141	6110.289	1126.346	-6614.0	1589.0	4030.9	-9.05	-7.32	2.33
10258.0	2136.895	6113.452	1134.412	-6631.7	1574.2	4035.3	-9.08	-7.31	2.32
10260.0	2123.614	6116.586	1142.488	-6649.9	1559.6	4040.0	-9.11	-7.31	2.31
10262.0	2110.296	6119.691	1150.573	-6668.1	1545.0	4044.6	-9.12	-7.31	2.29
10264.0	2096.942	6122.767	1158.667	-6686.4	1530.4	4049.1	-9.13	-7.30	2.29
10266.0	2083.551	6125.813	1166.770	-6704.7	1515.8	4053.7	-9.13	-7.30	2.30
10268.0	2070.124	6128.830	1174.882	-6722.9	1501.2	4058.3	-9.15	-7.30	2.27
10270.0	2056.660	6131.818	1183.004	-6741.3	1486.6	4062.8	-9.18	-7.30	2.24

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
10272.0	2043.159	6134.777	1191.134	-6759.7	1472.0	4067.3	-9.20	-7.31	2.21
10274.0	2029.622	6137.706	1199.274	-6778.0	1457.4	4071.6	-9.20	-7.32	2.17
10276.0	2016.048	6140.606	1207.421	-6796.4	1442.8	4075.9	-9.19	-7.33	2.14
10278.0	2002.437	6143.477	1215.578	-6814.7	1428.1	4080.4	-9.20	-7.33	2.12
10280.0	1988.789	6146.319	1223.743	-6833.2	1413.5	4084.6	-9.24	-7.32	2.10
10282.0	1975.104	6149.131	1231.916	-6851.7	1398.8	4088.8	-9.28	-7.31	2.07
10284.0	1961.382	6151.914	1240.098	-6870.2	1384.2	4092.9	-9.30	-7.31	2.04
10286.0	1947.623	6154.668	1248.288	-6888.8	1369.6	4096.9	-9.30	-7.32	2.01
10288.0	1933.827	6157.392	1256.486	-6907.4	1354.9	4100.9	-9.30	-7.33	2.00
10290.0	1919.993	6160.087	1264.691	-6926.0	1340.3	4104.9	-9.30	-7.34	1.99
10292.0	1906.123	6162.753	1272.905	-6944.7	1325.6	4108.9	-9.32	-7.34	1.98
10294.0	1892.215	6165.390	1281.127	-6963.3	1310.9	4112.8	-9.34	-7.35	1.96
10296.0	1878.269	6167.997	1289.357	-6982.0	1296.2	4116.7	-9.35	-7.34	1.93
10298.0	1864.287	6170.575	1297.594	-7000.7	1281.5	4120.6	-9.37	-7.34	1.90
10300.0	1850.266	6173.123	1305.839	-7019.5	1266.8	4124.4	-9.38	-7.35	1.89
10302.0	1836.209	6175.642	1314.091	-7038.3	1252.1	4128.1	-9.40	-7.35	1.88
10304.0	1822.113	6178.131	1322.351	-7057.1	1237.4	4131.9	-9.43	-7.35	1.87
10306.0	1807.980	6180.592	1330.619	-7076.0	1222.7	4135.6	-9.46	-7.35	1.87
10308.0	1793.809	6183.022	1338.894	-7094.9	1208.0	4139.4	-9.49	-7.35	1.87
10310.0	1779.601	6185.424	1347.176	-7113.9	1193.3	4143.1	-9.51	-7.35	1.86
10312.0	1765.354	6187.796	1355.466	-7133.0	1178.6	4146.8	-9.52	-7.36	1.85
10314.0	1751.069	6190.138	1363.763	-7152.0	1163.9	4150.5	-9.52	-7.37	1.84
10316.0	1736.746	6192.451	1372.068	-7171.0	1149.1	4154.2	-9.51	-7.39	1.83
10318.0	1722.385	6194.735	1380.380	-7190.0	1134.3	4157.8	-9.50	-7.40	1.82
10320.0	1707.986	6196.988	1388.699	-7209.1	1119.5	4161.4	-9.52	-7.40	1.79
10322.0	1693.548	6199.213	1397.026	-7228.1	1104.7	4165.0	-9.55	-7.39	1.76
10324.0	1679.073	6201.407	1405.359	-7247.3	1090.0	4168.5	-9.59	-7.38	1.73
10326.0	1664.559	6203.573	1413.700	-7266.5	1075.2	4171.9	-9.61	-7.38	1.70
10328.0	1650.007	6205.708	1422.047	-7285.7	1060.4	4175.3	-9.64	-7.38	1.69
10330.0	1635.416	6207.814	1430.401	-7305.0	1045.7	4178.7	-9.65	-7.38	1.69
10332.0	1620.787	6209.891	1438.762	-7324.3	1030.9	4182.1	-9.66	-7.39	1.68
10334.0	1606.119	6211.938	1447.129	-7343.7	1016.1	4185.4	-9.68	-7.39	1.67
10336.0	1591.412	6213.955	1455.504	-7363.1	1001.4	4188.8	-9.71	-7.39	1.67
10338.0	1576.667	6215.943	1463.884	-7382.5	986.6	4192.1	-9.76	-7.39	1.67
10340.0	1561.882	6217.902	1472.272	-7402.1	971.8	4195.5	-9.79	-7.39	1.68
10342.0	1547.058	6219.831	1480.666	-7421.7	957.0	4198.8	-9.82	-7.39	1.67
10344.0	1532.195	6221.730	1489.067	-7441.4	942.2	4202.1	-9.84	-7.40	1.67
10346.0	1517.293	6223.599	1497.475	-7461.0	927.4	4205.5	-9.85	-7.41	1.68
10348.0	1502.351	6225.439	1505.889	-7480.7	912.6	4208.8	-9.85	-7.41	1.67
10350.0	1487.370	6227.250	1514.310	-7500.4	897.8	4212.2	-9.84	-7.42	1.65
10352.0	1472.349	6229.030	1522.738	-7520.1	882.9	4215.4	-9.84	-7.43	1.62
10354.0	1457.290	6230.781	1531.172	-7539.8	868.1	4218.7	-9.88	-7.42	1.60
10356.0	1442.190	6232.503	1539.612	-7559.6	853.2	4221.8	-9.92	-7.42	1.58

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
10358.0	1427.051	6234.194	1548.059	-7579.5	838.4	4225.0	-9.96	-7.41	1.55
10360.0	1411.872	6235.856	1556.512	-7599.4	823.6	4228.0	-9.99	-7.40	1.53
10362.0	1396.653	6237.489	1564.971	-7619.4	808.8	4231.1	-10.00	-7.40	1.51
10364.0	1381.394	6239.091	1573.437	-7639.4	794.0	4234.1	-10.01	-7.41	1.51
10366.0	1366.096	6240.665	1581.908	-7659.4	779.2	4237.1	-9.99	-7.42	1.49
10368.0	1350.757	6242.208	1590.385	-7679.4	764.3	4240.1	-9.99	-7.43	1.48
10370.0	1335.378	6243.722	1598.868	-7699.4	749.5	4243.0	-10.02	-7.42	1.46
10372.0	1319.959	6245.206	1607.357	-7719.5	734.6	4245.9	-10.08	-7.41	1.44
10374.0	1304.500	6246.660	1615.851	-7739.7	719.8	4248.8	-10.14	-7.39	1.43
10376.0	1289.000	6248.085	1624.352	-7760.1	705.1	4251.6	-10.19	-7.38	1.41
10378.0	1273.459	6249.481	1632.858	-7780.5	690.3	4254.4	-10.21	-7.38	1.40
10380.0	1257.878	6250.847	1641.369	-7800.9	675.5	4257.2	-10.23	-7.39	1.40
10382.0	1242.256	6252.183	1649.887	-7821.4	660.7	4260.0	-10.26	-7.40	1.41
10384.0	1226.592	6253.489	1658.410	-7841.9	645.9	4262.8	-10.28	-7.41	1.41
10386.0	1210.888	6254.766	1666.938	-7862.5	631.1	4265.7	-10.29	-7.42	1.42
10388.0	1195.142	6256.014	1675.472	-7883.1	616.3	4268.5	-10.31	-7.41	1.41
10390.0	1179.355	6257.231	1684.012	-7903.8	601.4	4271.3	-10.34	-7.41	1.39
10392.0	1163.527	6258.420	1692.557	-7924.5	586.6	4274.1	-10.37	-7.41	1.37
10394.0	1147.657	6259.578	1701.108	-7945.3	571.8	4276.8	-10.40	-7.41	1.35
10396.0	1131.746	6260.707	1709.664	-7966.1	557.0	4279.5	-10.41	-7.41	1.33
10398.0	1115.793	6261.806	1718.226	-7986.9	542.2	4282.1	-10.41	-7.41	1.31
10400.0	1099.798	6262.875	1726.793	-8007.7	527.3	4284.7	-10.41	-7.41	1.27
10402.0	1083.762	6263.915	1735.365	-8028.6	512.5	4287.2	-10.45	-7.40	1.25
10404.0	1067.684	6264.926	1743.942	-8049.5	497.7	4289.7	-10.50	-7.39	1.22
10406.0	1051.564	6265.906	1752.523	-8070.6	483.0	4292.1	-10.55	-7.38	1.20
10408.0	1035.402	6266.858	1761.110	-8091.7	468.2	4294.5	-10.58	-7.37	1.17
10410.0	1019.197	6267.779	1769.701	-8112.8	453.5	4296.8	-10.58	-7.38	1.15
10412.0	1002.950	6268.671	1778.297	-8134.0	438.7	4299.1	-10.58	-7.39	1.15
10414.0	986.661	6269.534	1786.897	-8155.2	423.9	4301.4	-10.60	-7.40	1.14
10416.0	970.330	6270.367	1795.503	-8176.4	409.2	4303.7	-10.64	-7.38	1.13
10418.0	953.956	6271.171	1804.112	-8197.7	394.4	4305.9	-10.68	-7.36	1.10
10420.0	937.539	6271.945	1812.726	-8219.1	379.7	4308.0	-10.71	-7.36	1.06
10422.0	921.079	6272.690	1821.344	-8240.6	365.0	4310.2	-10.74	-7.36	1.05
10424.0	904.576	6273.405	1829.967	-8262.1	350.3	4312.2	-10.80	-7.36	1.04
10426.0	888.031	6274.091	1838.593	-8283.8	335.5	4314.3	-10.85	-7.35	1.04
10428.0	871.441	6274.747	1847.224	-8305.5	320.8	4316.4	-10.87	-7.35	1.03
10430.0	854.809	6275.374	1855.859	-8327.2	306.1	4318.5	-10.88	-7.35	1.03
10432.0	838.132	6275.972	1864.498	-8349.0	291.4	4320.5	-10.89	-7.36	1.03
10434.0	821.413	6276.540	1873.141	-8370.8	276.7	4322.6	-10.92	-7.37	1.02
10436.0	804.649	6277.078	1881.788	-8392.7	262.0	4324.6	-10.96	-7.37	1.00
10438.0	787.842	6277.587	1890.439	-8414.6	247.2	4326.6	-10.99	-7.36	0.98
10440.0	770.991	6278.067	1899.094	-8436.7	232.5	4328.5	-11.03	-7.35	0.96
10442.0	754.095	6278.518	1907.753	-8458.8	217.8	4330.4	-11.09	-7.34	0.94

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
10444.0	737.155	6278.939	1916.416	-8481.0	203.2	4332.3	-11.16	-7.33	0.93
10446.0	720.171	6279.330	1925.082	-8503.4	188.5	4334.1	-11.20	-7.34	0.92
10448.0	703.142	6279.692	1933.752	-8525.8	173.8	4335.9	-11.20	-7.35	0.90
10450.0	686.068	6280.025	1942.426	-8548.2	159.1	4337.7	-11.19	-7.34	0.88
10452.0	668.949	6280.329	1951.103	-8570.6	144.4	4339.5	-11.22	-7.33	0.88
10454.0	651.785	6280.603	1959.784	-8593.1	129.8	4341.2	-11.27	-7.33	0.87
10456.0	634.577	6280.848	1968.468	-8615.7	115.1	4342.9	-11.33	-7.33	0.85
10458.0	617.323	6281.063	1977.155	-8638.4	100.4	4344.6	-11.36	-7.33	0.82
10460.0	600.023	6281.250	1985.846	-8661.1	85.8	4346.2	-11.41	-7.33	0.80
10462.0	582.678	6281.407	1994.540	-8684.0	71.1	4347.8	-11.46	-7.33	0.80
10464.0	565.287	6281.534	2003.237	-8706.9	56.5	4349.4	-11.49	-7.33	0.79
10466.0	547.850	6281.633	2011.938	-8729.9	41.8	4350.9	-11.51	-7.33	0.77
10468.0	530.367	6281.702	2020.641	-8753.0	27.2	4352.5	-11.57	-7.33	0.76
10470.0	512.838	6281.741	2029.347	-8776.2	12.5	4354.0	-11.65	-7.31	0.75
10472.0	495.262	6281.752	2038.057	-8799.6	-2.1	4355.5	-11.71	-7.31	0.73
10474.0	477.640	6281.733	2046.769	-8823.0	-16.7	4356.9	-11.73	-7.33	0.72
10476.0	459.970	6281.685	2055.485	-8846.5	-31.4	4358.3	-11.75	-7.34	0.72
10478.0	442.253	6281.607	2064.203	-8870.1	-46.1	4359.8	-11.80	-7.35	0.73
10480.0	424.490	6281.500	2072.924	-8893.8	-60.8	4361.3	-11.89	-7.34	0.74
10482.0	406.678	6281.364	2081.648	-8917.6	-75.5	4362.7	-11.96	-7.33	0.72
10484.0	388.819	6281.198	2090.375	-8941.6	-90.1	4364.1	-12.03	-7.32	0.70
10486.0	370.912	6281.004	2099.104	-8965.7	-104.8	4365.5	-12.09	-7.33	0.69
10488.0	352.956	6280.779	2107.837	-8990.0	-119.4	4366.9	-12.14	-7.34	0.70
10490.0	334.952	6280.526	2116.572	-9014.3	-134.1	4368.3	-12.17	-7.36	0.71
10492.0	316.899	6280.243	2125.310	-9038.6	-148.9	4369.7	-12.19	-7.38	0.70
10494.0	298.797	6279.930	2134.051	-9063.0	-163.6	4371.1	-12.21	-7.39	0.68
10496.0	280.647	6279.588	2142.794	-9087.5	-178.4	4372.4	-12.25	-7.40	0.65
10498.0	262.447	6279.217	2151.541	-9112.0	-193.2	4373.7	-12.31	-7.39	0.61
10500.0	244.198	6278.815	2160.289	-9136.7	-208.0	4374.9	-12.40	-7.37	0.56
10502.0	225.900	6278.385	2169.040	-9161.6	-222.7	4375.9	-12.48	-7.35	0.50
10504.0	207.552	6277.925	2177.793	-9186.7	-237.4	4376.9	-12.56	-7.35	0.47
10506.0	189.153	6277.435	2186.548	-9211.9	-252.1	4377.8	-12.64	-7.36	0.47
10508.0	170.704	6276.916	2195.304	-9237.2	-266.8	4378.8	-12.69	-7.38	0.48
10510.0	152.205	6276.368	2204.063	-9262.6	-281.6	4379.8	-12.74	-7.42	0.49
10512.0	133.654	6275.790	2212.823	-9288.1	-296.5	4380.8	-12.78	-7.44	0.51
10514.0	115.052	6275.182	2221.586	-9313.8	-311.4	4381.8	-12.85	-7.45	0.52
10516.0	96.399	6274.544	2230.350	-9339.6	-326.3	4382.8	-12.94	-7.47	0.52
10518.0	77.694	6273.876	2239.117	-9365.5	-341.3	4383.8	-13.01	-7.48	0.49
10520.0	58.937	6273.179	2247.886	-9391.6	-356.2	4384.8	-13.07	-7.50	0.46
10522.0	40.127	6272.451	2256.656	-9417.8	-371.3	4385.7	-13.14	-7.52	0.44
10524.0	21.265	6271.694	2265.428	-9444.1	-386.3	4386.6	-13.21	-7.53	0.42
10526.0	2.351	6270.906	2274.202	-9470.6	-401.3	4387.4	-13.29	-7.52	0.41
10528.0	-16.617	6270.088	2282.978	-9497.3	-416.4	4388.2	-13.36	-7.57	0.35

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
10530.0	-35.639	6269.240	2291.755	-9524.1	-431.7	4388.7	-13.45	-7.69	0.23
10532.0	-54.714	6268.361	2300.533	-9551.1	-447.2	4389.1	-13.54	-7.80	0.14
10534.0	-73.843	6267.451	2309.311	-9578.3	-462.8	4389.4	-13.62	-7.84	0.10
10536.0	-93.027	6266.510	2318.090	-9605.6	-478.5	4389.6	-13.70	-7.83	0.13
10538.0	-112.266	6265.537	2326.870	-9633.1	-494.2	4389.9	-13.78	-7.81	0.16
10540.0	-131.559	6264.533	2335.650	-9660.7	-509.8	4390.2	-13.84	-7.81	0.16
10542.0	-150.908	6263.498	2344.430	-9688.4	-525.4	4390.5	-13.87	-7.79	0.18
10544.0	-170.313	6262.432	2353.212	-9716.2	-540.9	4390.9	-13.90	-7.78	0.20
10546.0	-189.773	6261.334	2361.994	-9744.0	-556.5	4391.3	-13.97	-7.78	0.22
10548.0	-209.289	6260.206	2370.777	-9772.0	-572.1	4391.8	-14.06	-7.78	0.25
10550.0	-228.861	6259.046	2379.561	-9800.2	-587.7	4392.3	-14.13	-7.82	0.27
10552.0	-248.490	6257.855	2388.346	-9828.6	-603.3	4392.9	-14.22	-7.84	0.32
10554.0	-268.176	6256.633	2397.133	-9857.1	-619.0	4393.6	-14.30	-7.82	0.37
S-IVB SECOND GUIDANCE CUTOFF									
10555.510	-283.076	6255.689	2403.767	-9878.7	-630.8	4394.1	-14.35	-7.80	0.40
10556.0	-287.915	6255.379	2405.920	-9882.1	-634.7	4393.5	0.39	-8.26	-3.19
10558.0	-307.679	6254.093	2414.700	-9881.3	-651.2	4387.1	0.41	-8.25	-3.20
10560.0	-327.438	6252.774	2423.468	-9880.5	-667.7	4380.7	0.43	-8.23	-3.21
10562.0	-347.199	6251.422	2432.223	-9879.6	-684.2	4374.2	0.45	-8.22	-3.22
10564.0	-366.957	6250.037	2440.965	-9878.7	-700.6	4367.8	0.48	-8.21	-3.22
TRANSLUNAR INJECTION									
10565.510	-381.873	6248.970	2447.557	-9877.9	-713.0	4362.9	0.50	-8.20	-3.22
10600.0	-722.178	6219.544	2596.096	-9853.2	-992.0	4249.8	0.92	-7.96	-3.33
10650.0	-1213.441	6160.155	2804.368	-9792.6	-1380.2	4080.1	1.49	-7.55	-3.45
10700.0	-1700.999	6081.894	3004.030	-9705.6	-1746.4	3905.9	1.98	-7.09	-3.51
10750.0	-2183.616	5985.919	3194.925	-9595.6	-2088.4	3729.8	2.40	-6.59	-3.53
10800.0	-2660.241	5873.476	3377.015	-9466.5	-2405.0	3554.0	2.75	-6.07	-3.50
10850.0	-3130.009	5745.856	3550.366	-9321.9	-2695.5	3380.5	3.02	-5.55	-3.44
10900.0	-3592.233	5604.356	3715.129	-9165.3	-2960.2	3210.7	3.23	-5.04	-3.35
10950.0	-4046.392	5450.249	3871.524	-8999.8	-3200.0	3046.0	3.38	-4.55	-3.24
11000.0	-4492.115	5284.757	4019.823	-8828.3	-3415.8	2887.0	3.47	-4.09	-3.12
11050.0	-4929.160	5109.040	4160.335	-8653.1	-3609.3	2734.6	3.53	-3.65	-2.98
11100.0	-5357.400	4924.178	4293.396	-8476.4	-3781.9	2589.0	3.54	-3.25	-2.84
11150.0	-5776.797	4731.175	4419.352	-8299.7	-3935.2	2450.4	3.52	-2.89	-2.70
11200.0	-6187.390	4530.947	4538.557	-8124.4	-4071.1	2318.9	3.48	-2.55	-2.56
11250.0	-6589.276	4324.334	4651.363	-7951.6	-4191.0	2194.4	3.43	-2.25	-2.42
11300.0	-6982.602	4112.093	4758.113	-7782.0	-4296.4	2076.7	3.35	-1.97	-2.29
11350.0	-7367.546	3894.908	4859.142	-7616.4	-4388.9	1965.5	3.27	-1.73	-2.16
11400.0	-7744.316	3673.397	4954.770	-7455.1	-4469.7	1860.6	3.18	-1.51	-2.04

TABLE B-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP KM	YSP KM	ZSP KM	DXSP M/S	DYSP M/S	DZSP M/S	DDXSP M/S SQ	DDYSP M/S SQ	DDZSP M/S SQ
11450.0	-8113.135	3448.110	5045.305	-7298.5	-4540.1	1761.7	3.09	-1.31	-1.92
11500.0	-8474.241	3219.542	5131.036	-7146.6	-4601.1	1668.5	2.99	-1.13	-1.81
11550.0	-8827.876	2988.136	5212.239	-6999.6	-4653.8	1580.5	2.89	-0.98	-1.71
11600.0	-9174.288	2754.284	5289.173	-6857.6	-4699.1	1497.6	2.79	-0.84	-1.61
11650.0	-9513.721	2518.339	5362.081	-6720.5	-4737.7	1419.4	2.69	-0.71	-1.52
11700.0	-9846.421	2280.613	5431.191	-6588.3	-4770.4	1345.7	2.60	-0.60	-1.43
11750.0	-10172.626	2041.387	5496.718	-6460.7	-4797.8	1276.1	2.50	-0.50	-1.35
11800.0	-10492.572	1800.909	5558.862	-6337.8	-4820.6	1210.3	2.41	-0.41	-1.28
11850.0	-10806.486	1559.401	5617.810	-6219.4	-4839.1	1148.2	2.32	-0.33	-1.21
11900.0	-11114.586	1317.060	5673.737	-6105.3	-4853.9	1089.4	2.24	-0.26	-1.14
11950.0	-11417.086	1074.064	5726.807	-5995.4	-4865.4	1033.9	2.16	-0.20	-1.08
12000.0	-11714.188	830.570	5777.173	-5889.4	-4873.9	981.2	2.08	-0.14	-1.02
12050.0	-12006.088	586.719	5824.976	-5787.2	-4879.7	931.4	2.01	-0.09	-0.97
SPACECRAFT SEPARATION SEQUENCE START									
12056.300	-12042.508	555.975	5830.825	-5774.6	-4880.3	925.3	2.00	-0.09	-0.96
S-IVB/CSM PHYSICAL SEPARATION									
12059.300	-12059.823	541.334	5833.596	-5768.7	-4880.5	922.4	1.99	-0.08	-0.96

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
	INITIATE S-IVB RESTART SEQUENCE									
9659.540	6572.447	162.4124	-11.5937	57.52	0.04	7391.3	59.38	0.04	7791.4	195149
9660.0	6572.450	162.4379	-11.5778	57.52	0.04	7391.3	59.37	0.04	7791.4	195149
9670.0	6572.502	162.9920	-11.2312	57.39	0.04	7391.3	59.26	0.04	7791.4	195152
9680.0	6572.554	163.5446	-10.8835	57.27	0.04	7391.3	59.14	0.04	7791.3	195155
9690.0	6572.606	164.0959	-10.5346	57.15	0.04	7391.3	59.03	0.04	7791.3	195159
9700.0	6572.658	164.6458	-10.1846	57.04	0.04	7391.3	58.92	0.04	7791.3	195164
9710.0	6572.709	165.1944	-9.8335	56.92	0.04	7391.3	58.82	0.04	7791.2	195170
9720.0	6572.760	165.7418	-9.4815	56.82	0.04	7391.3	58.72	0.04	7791.2	195177
9730.0	6572.810	166.2879	-9.1284	56.72	0.04	7391.3	58.63	0.04	7791.2	195185
9740.0	6572.860	166.8328	-8.7745	56.62	0.04	7391.3	58.53	0.04	7791.2	195194
9750.0	6572.909	167.3766	-8.4196	56.52	0.04	7391.3	58.45	0.04	7791.1	195204
9760.0	6572.958	167.9194	-8.0638	56.43	0.04	7391.2	58.36	0.04	7791.1	195215
9770.0	6573.007	168.4611	-7.7072	56.35	0.04	7391.2	58.28	0.04	7791.1	195228
9780.0	6573.055	169.0018	-7.3499	56.26	0.04	7391.2	58.21	0.04	7791.0	195241
9790.0	6573.103	169.5415	-6.9918	56.19	0.04	7391.2	58.13	0.03	7791.0	195255
9800.0	6573.150	170.0804	-6.6329	56.11	0.04	7391.2	58.06	0.03	7791.0	195271
9810.0	6573.197	170.6184	-6.2735	56.04	0.04	7391.2	58.00	0.03	7790.9	195287
9820.0	6573.243	171.1556	-5.9133	55.97	0.04	7391.2	57.94	0.03	7790.9	195305
9830.0	6573.289	171.6920	-5.5526	55.91	0.04	7391.2	57.88	0.03	7790.9	195324
9840.0	6573.334	172.2277	-5.1913	55.85	0.03	7391.2	57.82	0.03	7790.8	195344
9850.0	6573.379	172.7628	-4.8295	55.80	0.03	7391.1	57.77	0.03	7790.8	195365
9860.0	6573.423	173.2972	-4.4672	55.75	0.03	7391.1	57.73	0.03	7790.8	195387
9870.0	6573.467	173.8311	-4.1045	55.70	0.03	7391.1	57.68	0.03	7790.8	195411
9880.0	6573.510	174.3644	-3.7414	55.66	0.03	7391.1	57.64	0.03	7790.7	195435
9890.0	6573.553	174.8972	-3.3778	55.62	0.03	7391.1	57.61	0.03	7790.7	195461
9900.0	6573.595	175.4296	-3.0140	55.59	0.03	7391.0	57.58	0.03	7790.7	195488
9910.0	6573.636	175.9616	-2.6498	55.56	0.03	7391.0	57.55	0.03	7790.6	195516
9920.0	6573.678	176.4933	-2.2854	55.53	0.03	7391.0	57.52	0.03	7790.6	195546
9930.0	6573.718	177.0246	-1.9208	55.51	0.03	7391.0	57.50	0.03	7790.6	195576
9940.0	6573.758	177.5558	-1.5560	55.49	0.03	7390.9	57.48	0.03	7790.5	195608
9950.0	6573.798	178.0867	-1.1910	55.47	0.03	7390.9	57.47	0.03	7790.5	195641
9960.0	6573.837	178.6174	-0.8259	55.46	0.03	7390.9	57.46	0.03	7790.5	195675
9970.0	6573.875	179.1481	-0.4607	55.46	0.03	7390.9	57.45	0.03	7790.4	195710
9980.0	6573.913	179.6786	-0.0955	55.45	0.03	7390.8	57.45	0.03	7790.4	195747
9990.0	6573.950	-179.7908	0.2697	55.45	0.03	7390.8	57.45	0.03	7790.4	195785
10000.0	6573.987	-179.2602	0.6349	55.46	0.03	7390.7	57.46	0.03	7790.3	195823
10010.0	6574.023	-178.7295	1.0000	55.47	0.03	7390.7	57.47	0.03	7790.3	195864
10020.0	6574.059	-178.1988	1.3651	55.48	0.03	7390.7	57.48	0.03	7790.3	195905
10030.0	6574.094	-177.6678	1.7299	55.50	0.03	7390.6	57.49	0.03	7790.2	195947
10040.0	6574.128	-177.1366	2.0946	55.52	0.03	7390.6	57.51	0.03	7790.2	195991

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
10050.0	6574.162	-176.6052	2.4591	55.54	0.03	7390.5	57.53	0.02	7790.2	196036
10060.0	6574.195	-176.0735	2.8234	55.57	0.03	7390.5	57.56	0.02	7790.1	196082
10070.0	6574.228	-175.5414	3.1873	55.60	0.03	7390.4	57.59	0.02	7790.1	196129
10080.0	6574.260	-175.0089	3.5509	55.64	0.02	7390.4	57.63	0.02	7790.1	196177
10090.0	6574.292	-174.4759	3.9142	55.68	0.02	7390.3	57.66	0.02	7790.0	196226
10100.0	6574.323	-173.9425	4.2771	55.72	0.02	7390.3	57.70	0.02	7790.0	196277
10110.0	6574.353	-173.4085	4.6395	55.77	0.02	7390.2	57.75	0.02	7790.0	196328
10120.0	6574.383	-172.8739	5.0015	55.82	0.02	7390.2	57.80	0.02	7789.9	196381
10130.0	6574.413	-172.3387	5.3629	55.88	0.02	7390.1	57.85	0.02	7789.9	196435
10140.0	6574.441	-171.8029	5.7239	55.94	0.02	7390.1	57.91	0.02	7789.8	196489
10150.0	6574.470	-171.2663	6.0842	56.00	0.02	7390.0	57.97	0.02	7789.8	196545
10160.0	6574.497	-170.7289	6.4439	56.07	0.02	7390.0	58.03	0.02	7789.8	196602
10170.0	6574.524	-170.1907	6.8029	56.15	0.02	7389.9	58.10	0.02	7789.7	196660
10180.0	6574.551	-169.6516	7.1613	56.22	0.02	7389.8	58.17	0.02	7789.7	196719
10190.0	6574.577	-169.1117	7.5189	56.30	0.02	7389.8	58.24	0.02	7789.7	196779
10200.0	6574.602	-168.5707	7.8757	56.39	0.02	7389.7	58.32	0.02	7789.7	196840
10210.0	6574.627	-168.0288	8.2318	56.47	0.02	7389.7	58.40	0.02	7789.6	196902
10220.0	6574.651	-167.4858	8.5870	56.57	0.02	7389.6	58.49	0.02	7789.6	196965
	S-IVB RESTART COMMAND									
10229.510	6574.674	-166.9685	8.9239	56.66	0.02	7389.6	58.57	0.02	7789.6	197025
10230.0	6574.675	-166.9418	8.9413	56.66	0.02	7389.6	58.58	0.02	7789.7	197028
10232.0	6574.680	-166.8328	9.0120	56.68	0.02	7389.6	58.60	0.02	7789.7	197041
10234.0	6574.685	-166.7238	9.0827	56.70	0.02	7389.6	58.61	0.02	7789.7	197054
10236.0	6574.689	-166.6148	9.1534	56.72	0.02	7389.6	58.63	0.02	7789.7	197067
10238.0	6574.694	-166.5057	9.2240	56.74	0.02	7390.2	58.65	0.02	7790.3	197080
10240.0	6574.698	-166.3965	9.2947	56.76	0.02	7396.4	58.67	0.02	7796.5	197093
10242.0	6574.703	-166.2872	9.3653	56.79	0.02	7407.9	58.69	0.02	7808.0	197107
10244.0	6574.709	-166.1776	9.4361	56.81	0.02	7420.9	58.71	0.02	7821.0	197121
10246.0	6574.715	-166.0677	9.5069	56.84	0.03	7435.1	58.73	0.02	7835.2	197135
10248.0	6574.722	-165.9576	9.5778	56.87	0.03	7449.2	58.75	0.03	7849.4	197151
10250.0	6574.729	-165.8472	9.6488	56.90	0.03	7463.4	58.78	0.03	7863.6	197167
10252.0	6574.737	-165.7366	9.7199	56.93	0.03	7477.7	58.81	0.03	7877.9	197184
10254.0	6574.745	-165.6256	9.7910	56.96	0.03	7492.1	58.83	0.03	7892.3	197201
10256.0	6574.754	-165.5144	9.8623	56.98	0.03	7506.6	58.84	0.03	7906.8	197219
10258.0	6574.763	-165.4030	9.9336	57.00	0.04	7520.7	58.86	0.03	7921.0	197237
10260.0	6574.773	-165.2912	10.0050	57.02	0.04	7535.4	58.88	0.04	7935.7	197256
10262.0	6574.784	-165.1792	10.0765	57.05	0.04	7550.2	58.90	0.04	7950.5	197276
10264.0	6574.796	-165.0669	10.1482	57.07	0.05	7565.0	58.92	0.04	7965.3	197298
10266.0	6574.810	-164.9544	10.2199	57.09	0.05	7579.9	58.93	0.05	7980.2	197320
10268.0	6574.825	-164.8415	10.2917	57.12	0.06	7594.8	58.95	0.06	7995.1	197345
10270.0	6574.841	-164.7284	10.3636	57.14	0.07	7609.8	58.97	0.06	8010.1	197371

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
10272.0	6574.860	-164.6150	10.4356	57.17	0.07	7624.8	58.99	0.07	8025.1	197399
10274.0	6574.881	-164.5013	10.5076	57.20	0.08	7639.9	59.02	0.08	8040.1	197430
10276.0	6574.904	-164.3873	10.5798	57.22	0.09	7654.9	59.04	0.09	8055.2	197462
10278.0	6574.929	-164.2731	10.6521	57.25	0.10	7670.0	59.06	0.09	8070.3	197498
10280.0	6574.957	-164.1585	10.7244	57.28	0.11	7685.1	59.08	0.10	8085.4	197535
10282.0	6574.988	-164.0437	10.7969	57.31	0.12	7700.3	59.10	0.11	8100.6	197576
10284.0	6575.022	-163.9286	10.8694	57.33	0.13	7715.5	59.13	0.12	8115.9	197620
10286.0	6575.058	-163.8132	10.9420	57.37	0.14	7730.8	59.15	0.14	8131.2	197667
10288.0	6575.099	-163.6975	11.0147	57.40	0.16	7746.1	59.18	0.15	8146.5	197717
10290.0	6575.142	-163.5815	11.0874	57.43	0.17	7761.5	59.21	0.16	8161.9	197771
10292.0	6575.190	-163.4651	11.1603	57.46	0.18	7776.9	59.23	0.17	8177.3	197829
10294.0	6575.241	-163.3485	11.2332	57.49	0.20	7792.3	59.26	0.19	8192.8	197891
10296.0	6575.296	-163.2316	11.3062	57.52	0.21	7807.8	59.29	0.20	8208.3	197956
10298.0	6575.356	-163.1144	11.3793	57.56	0.23	7823.3	59.31	0.22	8223.8	198027
10300.0	6575.420	-162.9969	11.4525	57.59	0.24	7838.8	59.34	0.23	8239.4	198101
10302.0	6575.489	-162.8791	11.5257	57.62	0.26	7854.5	59.37	0.25	8255.1	198181
10304.0	6575.562	-162.7609	11.5991	57.66	0.28	7870.1	59.40	0.26	8270.8	198265
10306.0	6575.641	-162.6425	11.6724	57.69	0.29	7885.9	59.43	0.28	8286.6	198355
10308.0	6575.725	-162.5237	11.7459	57.73	0.31	7901.8	59.46	0.30	8302.5	198449
10310.0	6575.814	-162.4046	11.8195	57.76	0.33	7917.7	59.49	0.32	8318.5	198550
10312.0	6575.909	-162.2853	11.8931	57.80	0.35	7933.7	59.52	0.34	8334.5	198656
10314.0	6576.010	-162.1655	11.9668	57.84	0.37	7949.8	59.55	0.36	8350.6	198768
10316.0	6576.116	-162.0455	12.0405	57.87	0.40	7965.8	59.58	0.38	8366.7	198886
10318.0	6576.230	-161.9251	12.1144	57.91	0.42	7981.9	59.61	0.40	8382.8	199010
10320.0	6576.349	-161.8045	12.1883	57.95	0.44	7997.9	59.65	0.42	8398.9	199141
10322.0	6576.475	-161.6835	12.2622	57.99	0.46	8014.1	59.68	0.44	8415.1	199279
10324.0	6576.608	-161.5621	12.3363	58.03	0.49	8030.3	59.71	0.46	8431.3	199423
10326.0	6576.749	-161.4405	12.4104	58.07	0.51	8046.5	59.75	0.49	8447.6	199575
10328.0	6576.896	-161.3185	12.4846	58.11	0.54	8062.9	59.78	0.51	8464.0	199734
10330.0	6577.050	-161.1962	12.5588	58.15	0.56	8079.2	59.82	0.54	8480.5	199901
10332.0	6577.213	-161.0735	12.6331	58.19	0.59	8095.7	59.85	0.56	8497.0	200075
10334.0	6577.384	-160.9505	12.7075	58.23	0.62	8112.2	59.89	0.59	8513.5	200259
10336.0	6577.562	-160.8272	12.7819	58.27	0.64	8128.8	59.92	0.61	8530.1	200448
10338.0	6577.749	-160.7035	12.8564	58.31	0.67	8145.4	59.96	0.64	8546.9	200648
10340.0	6577.945	-160.5795	12.9309	58.36	0.70	8162.2	60.00	0.67	8563.7	200855
10342.0	6578.150	-160.4551	13.0055	58.40	0.73	8179.1	60.04	0.70	8580.6	201072
10344.0	6578.363	-160.3304	13.0802	58.44	0.76	8196.0	60.07	0.73	8597.6	201298
10346.0	6578.586	-160.2053	13.1549	58.49	0.79	8213.1	60.11	0.76	8614.7	201534
10348.0	6578.819	-160.0799	13.2297	58.53	0.83	8230.1	60.15	0.79	8631.8	201778
10350.0	6579.061	-159.9541	13.3045	58.58	0.86	8247.2	60.19	0.82	8649.0	202033
10352.0	6579.313	-159.8280	13.3794	58.62	0.89	8264.3	60.23	0.85	8666.1	202298
10354.0	6579.576	-159.7015	13.4543	58.67	0.93	8281.4	60.27	0.88	8683.3	202573
10356.0	6579.849	-159.5747	13.5293	58.71	0.96	8298.6	60.31	0.92	8700.6	202859

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
10358.0	6580.132	-159.4475	13.6044	58.76	1.00	8315.9	60.35	0.95	8717.9	203155
10360.0	6580.427	-159.3199	13.6795	58.81	1.03	8333.2	60.39	0.98	8735.3	203463
10362.0	6580.733	-159.1920	13.7546	58.86	1.07	8350.6	60.44	1.02	8752.8	203782
10364.0	6581.050	-159.0637	13.8298	58.91	1.11	8368.1	60.48	1.06	8770.3	204112
10366.0	6581.379	-158.9350	13.9051	58.96	1.14	8385.6	60.52	1.09	8787.9	204454
10368.0	6581.719	-158.8060	13.9803	59.00	1.18	8403.0	60.57	1.13	8805.4	204808
10370.0	6582.072	-158.6766	14.0557	59.05	1.22	8420.6	60.61	1.17	8823.0	205174
10372.0	6582.438	-158.5468	14.1310	59.11	1.26	8438.2	60.65	1.20	8840.7	205553
10374.0	6582.816	-158.4167	14.2065	59.16	1.30	8455.9	60.70	1.24	8858.5	205944
10376.0	6583.207	-158.2862	14.2819	59.21	1.34	8473.8	60.75	1.28	8876.5	206349
10378.0	6583.611	-158.1553	14.3574	59.26	1.39	8491.7	60.79	1.32	8894.5	206766
10380.0	6584.029	-158.0240	14.4329	59.31	1.43	8509.7	60.84	1.36	8912.6	207198
10382.0	6584.460	-157.8923	14.5085	59.37	1.47	8527.8	60.89	1.41	8930.8	207643
10384.0	6584.906	-157.7602	14.5841	59.42	1.52	8546.0	60.94	1.45	8949.0	208102
10386.0	6585.365	-157.6278	14.6597	59.48	1.56	8564.2	60.98	1.49	8967.3	208576
10388.0	6585.839	-157.4950	14.7353	59.53	1.61	8582.5	61.03	1.54	8985.7	209064
10390.0	6586.328	-157.3617	14.8110	59.58	1.65	8600.9	61.08	1.58	9004.2	209567
10392.0	6586.832	-157.2281	14.8867	59.64	1.70	8619.3	61.13	1.62	9022.7	210085
10394.0	6587.352	-157.0941	14.9625	59.70	1.75	8637.8	61.18	1.67	9041.3	210618
10396.0	6587.887	-156.9597	15.0383	59.75	1.80	8656.3	61.23	1.72	9059.9	211168
10398.0	6588.437	-156.8248	15.1141	59.81	1.85	8674.9	61.28	1.76	9078.6	211733
10400.0	6589.004	-156.6896	15.1899	59.87	1.90	8693.5	61.33	1.81	9097.2	212314
10402.0	6589.588	-156.5540	15.2657	59.93	1.95	8712.1	61.39	1.86	9116.0	212912
10404.0	6590.188	-156.4180	15.3416	59.98	2.00	8730.8	61.44	1.91	9134.8	213526
10406.0	6590.805	-156.2815	15.4175	60.04	2.05	8749.6	61.49	1.96	9153.6	214158
10408.0	6591.439	-156.1447	15.4934	60.11	2.10	8768.4	61.55	2.01	9172.6	214807
10410.0	6592.091	-156.0074	15.5693	60.17	2.15	8787.3	61.60	2.06	9191.6	215473
10412.0	6592.761	-155.8698	15.6452	60.23	2.21	8806.3	61.66	2.11	9210.7	216158
10414.0	6593.448	-155.7317	15.7211	60.29	2.26	8825.2	61.71	2.16	9229.8	216860
10416.0	6594.155	-155.5932	15.7971	60.35	2.32	8844.3	61.77	2.22	9248.9	217581
10418.0	6594.879	-155.4543	15.8730	60.42	2.37	8863.4	61.83	2.27	9268.2	218321
10420.0	6595.623	-155.3149	15.9490	60.48	2.43	8882.6	61.89	2.32	9287.5	219080
10422.0	6596.387	-155.1752	16.0249	60.54	2.49	8901.9	61.94	2.38	9306.9	219859
10424.0	6597.169	-155.0350	16.1009	60.61	2.55	8921.3	62.00	2.44	9326.3	220656
10426.0	6597.972	-154.8944	16.1768	60.67	2.61	8940.7	62.06	2.49	9345.9	221474
10428.0	6598.795	-154.7534	16.2527	60.74	2.66	8960.3	62.12	2.55	9365.6	222312
10430.0	6599.638	-154.6119	16.3287	60.81	2.72	8979.9	62.18	2.61	9385.4	223171
10432.0	6600.503	-154.4700	16.4046	60.87	2.79	8999.6	62.25	2.67	9405.2	224051
10434.0	6601.388	-154.3277	16.4805	60.94	2.85	9019.4	62.31	2.72	9425.1	224952
10436.0	6602.295	-154.1849	16.5565	61.01	2.91	9039.2	62.37	2.78	9445.0	225874
10438.0	6603.223	-154.0417	16.6324	61.08	2.97	9059.1	62.43	2.84	9465.0	226818
10440.0	6604.174	-153.8981	16.7083	61.15	3.04	9079.1	62.49	2.91	9485.1	227784
10442.0	6605.147	-153.7540	16.7841	61.22	3.10	9099.1	62.56	2.97	9505.3	228773

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
10444.0	6606.142	-153.6095	16.8600	61.29	3.17	9119.3	62.62	3.03	9525.6	229784
10446.0	6607.161	-153.4645	16.9358	61.36	3.23	9139.6	62.69	3.09	9546.1	230818
10448.0	6608.203	-153.3191	17.0116	61.43	3.30	9160.0	62.75	3.16	9566.6	231876
10450.0	6609.268	-153.1732	17.0874	61.50	3.36	9180.4	62.82	3.22	9587.1	232957
10452.0	6610.357	-153.0269	17.1632	61.58	3.43	9200.8	62.89	3.29	9607.6	234063
10454.0	6611.471	-152.8801	17.2389	61.65	3.50	9221.3	62.95	3.35	9628.3	235192
10456.0	6612.609	-152.7329	17.3146	61.72	3.57	9241.9	63.02	3.42	9649.0	236347
10458.0	6613.773	-152.5852	17.3903	61.80	3.64	9262.6	63.09	3.49	9669.9	237526
10460.0	6614.961	-152.4370	17.4659	61.87	3.71	9283.4	63.16	3.55	9690.8	238731
10462.0	6616.175	-152.2884	17.5416	61.95	3.78	9304.3	63.23	3.62	9711.9	239961
10464.0	6617.415	-152.1394	17.6171	62.02	3.85	9325.3	63.30	3.69	9733.0	241217
10466.0	6618.681	-151.9899	17.6926	62.10	3.92	9346.4	63.37	3.76	9754.2	242500
10468.0	6619.974	-151.8399	17.7681	62.18	4.00	9367.5	63.44	3.83	9775.5	243809
10470.0	6621.293	-151.6894	17.8436	62.26	4.07	9388.8	63.51	3.90	9796.9	245145
10472.0	6622.640	-151.5385	17.9189	62.34	4.15	9410.2	63.58	3.97	9818.5	246508
10474.0	6624.015	-151.3871	17.9943	62.42	4.22	9431.8	63.66	4.05	9840.2	247900
10476.0	6625.417	-151.2352	18.0696	62.50	4.30	9453.3	63.73	4.12	9861.9	249318
10478.0	6626.848	-151.0828	18.1448	62.58	4.37	9475.0	63.81	4.19	9883.7	250766
10480.0	6628.307	-150.9300	18.2200	62.66	4.45	9496.9	63.88	4.27	9905.7	252241
10482.0	6629.795	-150.7767	18.2951	62.74	4.53	9518.9	63.95	4.34	9927.9	253746
10484.0	6631.312	-150.6228	18.3701	62.82	4.61	9541.0	64.03	4.42	9950.2	255280
10486.0	6632.859	-150.4686	18.4451	62.90	4.68	9563.3	64.11	4.49	9972.6	256844
10488.0	6634.436	-150.3138	18.5201	62.99	4.76	9585.7	64.18	4.57	9995.2	258438
10490.0	6636.043	-150.1585	18.5949	63.07	4.84	9608.2	64.26	4.65	10017.9	260063
10492.0	6637.682	-150.0027	18.6697	63.15	4.92	9630.8	64.34	4.72	10040.6	261718
10494.0	6639.351	-149.8465	18.7445	63.24	5.01	9653.4	64.42	4.80	10063.4	263404
10496.0	6641.051	-149.6897	18.8191	63.32	5.09	9676.1	64.50	4.88	10086.3	265121
10498.0	6642.783	-149.5325	18.8937	63.41	5.17	9698.9	64.58	4.96	10109.2	266870
10500.0	6644.547	-149.3747	18.9682	63.50	5.25	9721.8	64.66	5.04	10132.3	268651
10502.0	6646.343	-149.2165	19.0426	63.58	5.34	9744.8	64.74	5.12	10155.5	270465
10504.0	6648.172	-149.0577	19.1169	63.67	5.42	9768.0	64.82	5.20	10178.8	272311
10506.0	6650.035	-148.8985	19.1912	63.76	5.51	9791.4	64.91	5.28	10202.3	274191
10508.0	6651.930	-148.7387	19.2653	63.85	5.59	9814.8	64.99	5.37	10226.0	276104
10510.0	6653.860	-148.5784	19.3394	63.95	5.68	9838.4	65.07	5.45	10249.8	278050
10512.0	6655.823	-148.4177	19.4133	64.04	5.76	9862.2	65.16	5.53	10273.7	280031
10514.0	6657.821	-148.2564	19.4872	64.13	5.85	9886.1	65.24	5.62	10297.7	282047
10516.0	6659.854	-148.0945	19.5610	64.22	5.94	9910.1	65.33	5.70	10322.0	284097
10518.0	6661.922	-147.9322	19.6346	64.31	6.03	9934.3	65.42	5.78	10346.4	286182
10520.0	6664.026	-147.7693	19.7082	64.41	6.11	9958.7	65.50	5.87	10370.9	288303
10522.0	6666.165	-147.6059	19.7816	64.50	6.20	9983.1	65.59	5.96	10395.5	290460
10524.0	6668.340	-147.4420	19.8550	64.59	6.29	10007.7	65.68	6.04	10420.3	292653
10526.0	6670.552	-147.2776	19.9282	64.69	6.38	10032.5	65.77	6.13	10445.3	294883
10528.0	6672.801	-147.1126	20.0013	64.79	6.47	10057.4	65.86	6.22	10470.3	297149

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
10530.0	6675.087	-146.9471	20.0743	64.88	6.56	10082.4	65.95	6.30	10495.5	299452
10532.0	6677.410	-146.7811	20.1472	64.98	6.65	10107.5	66.04	6.39	10520.8	301793
10534.0	6679.769	-146.6145	20.2199	65.08	6.74	10132.7	66.13	6.47	10546.3	304170
10536.0	6682.166	-146.4474	20.2925	65.18	6.83	10158.2	66.23	6.56	10571.9	306585
10538.0	6684.600	-146.2797	20.3650	65.28	6.92	10183.8	66.32	6.65	10597.7	309037
10540.0	6687.073	-146.1115	20.4373	65.38	7.01	10209.6	66.42	6.73	10623.7	311527
10542.0	6689.584	-145.9428	20.5095	65.49	7.10	10235.5	66.51	6.82	10649.8	314056
10544.0	6692.135	-145.7735	20.5816	65.59	7.19	10261.5	66.61	6.91	10676.0	316624
10546.0	6694.725	-145.6036	20.6535	65.69	7.29	10287.6	66.70	7.00	10702.3	319232
10548.0	6697.355	-145.4333	20.7252	65.79	7.38	10313.9	66.80	7.10	10728.8	321880
10550.0	6700.026	-145.2623	20.7969	65.89	7.48	10340.5	66.90	7.19	10755.6	324569
10552.0	6702.738	-145.0908	20.8683	66.00	7.57	10367.2	66.99	7.28	10782.5	327299
10554.0	6705.492	-144.9188	20.9397	66.10	7.67	10394.2	67.09	7.37	10809.7	330070
	S-IVB SECOND	GUIDANCE CUTOFF								
10555.510	6707.598	-144.7885	20.9934	66.18	7.74	10414.6	67.16	7.44	10830.3	332190
10556.0	6708.287	-144.7462	21.0108	66.20	7.77	10417.7	67.18	7.47	10833.4	332883
10558.0	6711.119	-144.5733	21.0818	66.27	7.86	10415.2	67.25	7.56	10831.0	335734
10560.0	6713.985	-144.4005	21.1525	66.33	7.96	10412.8	67.31	7.65	10828.7	338617
10562.0	6716.884	-144.2276	21.2230	66.40	8.05	10410.3	67.38	7.74	10826.3	341534
10564.0	6719.817	-144.0547	21.2932	66.47	8.14	10407.8	67.44	7.83	10823.9	344484
	TRANSLUNAR	INJECTION								
10565.510	6722.052	-143.9242	21.3460	66.52	8.22	10405.9	67.49	7.90	10822.0	346733
10600.0	6778.199	-140.9421	22.5119	67.73	9.82	10358.4	68.66	9.44	10776.4	403183
10650.0	6876.368	-136.6306	24.0579	69.58	12.11	10276.9	70.45	11.62	10698.0	501773
10700.0	6993.356	-132.3577	25.4261	71.52	14.33	10182.0	72.33	13.74	10606.8	619152
10750.0	7127.899	-128.1504	26.6137	73.53	16.48	10075.8	74.28	15.78	10504.7	754047
10800.0	7278.656	-124.0340	27.6233	75.57	18.55	9960.4	76.25	17.75	10393.7	905111
10850.0	7444.254	-120.0308	28.4617	77.63	20.54	9837.6	78.24	19.62	10275.8	1070970
10900.0	7623.328	-116.1600	29.1388	79.68	22.45	9709.2	80.21	21.42	10152.6	1250260
10950.0	7814.550	-112.4366	29.6672	81.70	24.28	9576.9	82.14	23.12	10025.7	1441652
11000.0	8016.653	-108.8715	30.0607	83.67	26.02	9442.2	84.02	24.75	9896.5	1643884
11050.0	8228.444	-105.4720	30.3336	85.58	27.69	9306.3	85.84	26.29	9766.3	1855765
11100.0	8448.817	-102.2416	30.5003	87.43	29.29	9170.2	87.59	27.75	9636.1	2076193
11150.0	8676.754	-99.1806	30.5746	89.20	30.81	9034.9	89.25	29.13	9506.6	2304156
11200.0	8911.328	-96.2870	30.5693	90.90	32.27	8901.0	90.83	30.44	9378.5	2538729
11250.0	9151.699	-93.5567	30.4963	92.51	33.66	8769.0	92.33	31.69	9252.4	2779077
11300.0	9397.110	-90.9840	30.3661	94.06	34.99	8639.4	93.74	32.87	9128.6	3024446
11350.0	9646.881	-88.5624	30.1883	95.52	36.26	8512.5	95.07	33.98	9007.5	3274160
11400.0	9900.405	-86.2844	29.9711	96.92	37.48	8388.5	96.32	35.04	8889.3	3527615

TABLE B-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST KM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL M/S	HEAD DEG	FLT-PATH DEG	SF VEL M/S	ALTITUDE M
11450.0	10157.142	-84.1423	29.7218	98.24	38.65	8267.7	97.50	36.05	8774.0	3784272
11500.0	10416.609	-82.1284	29.4464	99.50	39.77	8150.0	98.60	37.01	8661.9	4043651
11550.0	10678.380	-80.2348	29.1504	100.70	40.85	8035.6	99.63	37.92	8552.8	4305328
11600.0	10942.074	-78.4541	28.8384	101.84	41.89	7924.5	100.59	38.78	8447.0	4568923
11650.0	11207.356	-76.7788	28.5140	102.93	42.89	7816.6	101.50	39.61	8344.2	4834103
11700.0	11473.928	-75.2020	28.1807	103.98	43.85	7712.0	102.35	40.39	8244.6	5100572
11750.0	11741.529	-73.7172	27.8411	104.98	44.78	7610.5	103.15	41.14	8147.9	5368067
11800.0	12009.925	-72.3181	27.4975	105.93	45.68	7512.1	103.90	41.86	8054.3	5636358
11850.0	12278.911	-70.9991	27.1517	106.86	46.55	7416.8	104.60	42.54	7963.5	5905238
11900.0	12548.305	-69.7547	26.8055	107.75	47.39	7324.5	105.26	43.20	7875.4	6174528
11950.0	12817.948	-68.5800	26.4600	108.61	48.21	7234.9	105.89	43.83	7790.1	6444067
12000.0	13087.696	-67.4703	26.1164	109.44	49.00	7148.1	106.47	44.43	7707.3	6713713
12050.0	13357.423	-66.4212	25.7755	110.25	49.78	7064.0	107.02	45.00	7627.0	6983340
SPACECRAFT SEPARATION SEQUENCE START										
12056.300	13391.401	-66.2932	25.7327	110.35	49.87	7053.6	107.09	45.08	7617.1	7017306
S-IVB/CSM PHYSICAL SEPARATION										
12059.300	13407.581	-66.2325	25.7124	110.40	49.92	7048.6	107.12	45.11	7612.4	7033479

TABLE B-VIII. FREE FLIGHT TRAJECTORY - S-IC STAGE

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	RANGE M	ALTITUDE M	LONG DEG E	LAT DEG N
160.0	70702	652	103659	874.7	5.7	2156.5	102575	71535	-79.6019	28.8849
170.0	78979	714	125198	781.0	6.8	2151.7	123719	80192	-79.3949	28.9414
180.0	86323	789	146697	688.0	8.0	2148.3	144788	87988	-79.1882	28.9973
190.0	92741	875	168164	595.5	9.3	2145.0	165797	94925	-78.9820	29.0526
200.0	98234	975	189598	503.2	10.6	2141.7	186754	101008	-78.7759	29.1074
210.0	102805	1087	210997	411.0	11.9	2138.2	207666	106238	-78.5701	29.1615
220.0	106455	1212	232361	319.0	13.2	2134.5	228542	110616	-78.3643	29.2151
230.0	109185	1351	253687	227.1	14.6	2130.6	249386	114143	-78.1586	29.2682
240.0	110998	1504	274973	135.4	16.0	2126.5	270206	116820	-77.9529	29.3208
250.0	111893	1671	296217	43.7	17.4	2122.3	291008	118648	-77.7471	29.3728
260.0	111871	1853	317417	-48.0	18.9	2117.8	311798	119627	-77.5412	29.4244
270.0	110933	2049	338572	-139.6	20.4	2113.1	332584	119758	-77.3350	29.4755
280.0	109079	2261	359679	-231.2	21.9	2108.3	353371	119040	-77.1286	29.5261
290.0	106308	2488	380737	-322.9	23.5	2103.2	374166	117473	-76.9218	29.5763
300.0	102621	2731	401743	-414.6	25.1	2098.0	394976	115058	-76.7147	29.6260
310.0	98016	2990	422696	-506.3	26.7	2092.5	415806	111792	-76.5071	29.6753
320.0	92494	3265	443592	-598.2	28.4	2086.8	436664	107677	-76.2989	29.7241
330.0	86052	3557	464431	-690.2	30.0	2080.9	457556	102710	-76.0902	29.7726
340.0	78690	3866	485210	-782.3	31.7	2074.8	478488	96890	-75.8808	29.8206
350.0	70406	4192	505927	-874.5	33.5	2068.5	499467	90216	-75.6707	29.8682
360.0	61199	4535	526578	-966.9	35.2	2061.6	520499	82687	-75.4598	29.9155
370.0	51069	4896	547156	-1058.9	37.0	2053.6	541583	74303	-75.2481	29.9624
380.0	40026	5274	567638	-1149.2	38.7	2041.8	562708	65071	-75.0358	30.0088
390.0	28108	5669	587951	-1232.3	40.2	2017.4	583805	55024	-74.8235	30.0546
400.0	15467	6075	607851	-1287.5	40.8	1950.1	604627	44288	-74.6137	30.0994
410.0	2736	6472	626413	-1222.6	37.5	1712.7	624203	33401	-74.4163	30.1409
420.0	-7907	6792	640711	-855.4	25.0	1088.6	639411	24224	-74.2628	30.1729
430.0	-14267	6970	648296	-451.1	11.7	484.9	647567	18660	-74.1804	30.1899
440.0	-17673	7050	651523	-259.0	5.2	201.7	651113	15599	-74.1445	30.1972
450.0	-19885	7087	652903	-201.2	2.7	93.8	652707	13540	-74.1284	30.2004
460.0	-21829	7108	653579	-188.9	1.5	46.0	653575	11674	-74.1196	30.2022
470.0	-23667	7119	653888	-178.4	0.9	18.3	654068	9878	-74.1146	30.2032
480.0	-25390	7126	653984	-166.1	0.4	2.5	654338	8174	-74.1119	30.2037
490.0	-26990	7129	653962	-154.0	0.2	-5.8	654479	6580	-74.1104	30.2039
500.0	-28474	7130	653881	-143.2	0.1	-9.8	654550	5095	-74.1097	30.2040
510.0	-29857	7130	653774	-133.7	-0.0	-11.4	654584	3708	-74.1093	30.2040
520.0	-31151	7130	653658	-125.1	-0.0	-11.7	654600	2410	-74.1092	30.2040
530.0	-32363	7130	653542	-117.5	-0.1	-11.5	654608	1192	-74.1091	30.2040
540.0	-33504	7129	653429	-111.0	-0.1	-11.1	654611	46	-74.1090	30.2040
S-IC STAGE IMPACT										
540.410	-33550	7129	653425	-110.7	-0.1	-11.1	654612	0	-74.1090	30.2040

TABLE B-IX. FREE FLIGHT TRAJECTORY - S-II STAGE

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE M	YE M	ZE M	DXE M/S	DYE M/S	DZE M/S	RANGE M	ALTITUDE M	LONG DEG E	LAT DEG N
540.0	-13889	25719	1634268	-1547.6	167.4	6208.8	1603519	192539	-64.3535	31.8573
560.0	-46473	29160	1758011	-1710.7	176.6	6164.9	1727764	192997	-63.0515	32.0082
580.0	-82310	32784	1880845	-1872.8	185.8	6118.0	1852007	192570	-61.7452	32.1439
600.0	-121381	36592	2002710	-2034.2	195.0	6068.0	1976285	191258	-60.4347	32.2644
620.0	-163671	40583	2123544	-2194.6	204.1	6014.9	2100632	189062	-59.1199	32.3696
640.0	-209160	44755	2243284	-2354.2	213.1	5958.7	2225085	185982	-57.8010	32.4593
660.0	-257831	49107	2361871	-2512.8	222.1	5899.4	2349679	182018	-56.4781	32.5334
680.0	-309665	53637	2479241	-2670.5	230.9	5837.1	2474450	177171	-55.1512	32.5919
700.0	-364645	58344	2595334	-2827.3	239.7	5771.6	2599434	171442	-53.8204	32.6346
720.0	-422750	63224	2710086	-2983.1	248.4	5703.1	2724669	164832	-52.4859	32.6615
740.0	-483961	68277	2823437	-3137.9	256.9	5631.4	2850189	157341	-51.1477	32.6723
760.0	-548259	73499	2935322	-3291.7	265.3	5556.6	2976033	148972	-49.8060	32.6670
780.0	-615623	78888	3045679	-3444.5	273.5	5478.6	3102238	139725	-48.4608	32.6455
800.0	-686033	84440	3154445	-3596.3	281.6	5397.4	3228842	129602	-47.1123	32.6077
820.0	-759466	90153	3261555	-3746.9	289.6	5313.1	3355881	118604	-45.7606	32.5534
840.0	-835901	96021	3366945	-3896.4	297.3	5225.3	3483394	106734	-44.4059	32.4824
860.0	-915310	102042	3470543	-4044.1	304.8	5133.6	3611413	93995	-43.0484	32.3947
880.0	-997619	108207	3572219	-4183.4	311.5	5029.8	3739895	80396	-41.6889	32.2903
900.0	-1082238	114470	3671244	-4253.6	312.9	4844.1	3868021	66019	-40.3368	32.1698
920.0	-1165300	120538	3763268	-3934.8	285.3	4232.2	3990135	51413	-39.0518	32.0398
940.0	-1232366	125347	3833134	-2576.5	181.5	2569.2	4085577	38695	-38.0504	31.9279
960.0	-1267446	127743	3866175	-1081.3	69.3	912.9	4132863	30501	-37.5552	31.8689
980.0	-1282059	128590	3876722	-485.7	23.3	255.8	4150044	25243	-37.3755	31.8467
1000.0	-1289245	128857	3879069	-266.4	6.1	17.8	4156251	20951	-37.3106	31.8385
1020.0	-1293727	128906	3878439	-188.7	-0.2	-65.6	4158463	17005	-37.2875	31.8355
1040.0	-1296951	128878	3876884	-138.1	-2.2	-83.2	4159181	13499	-37.2800	31.8344
1060.0	-1299397	128830	3875253	-109.7	-2.5	-78.5	4159368	10565	-37.2781	31.8341
1080.0	-1301427	126782	3873759	-94.3	-2.3	-70.8	4159411	8044	-37.2776	31.8340
1100.0	-1303197	128738	3872422	-83.3	-2.1	-63.2	4159421	5826	-37.2775	31.8339
1120.0	-1304775	128698	3871223	-74.9	-1.9	-56.9	4159425	3843	-37.2775	31.8339
1140.0	-1306205	128663	3870136	-68.3	-1.7	-51.9	4159428	2047	-37.2775	31.8338
1160.0	-1307515	128630	3869140	-63.0	-1.6	-47.9	4159431	400	-37.2775	31.8338
	S-II STAGE IMPACT									
1165.106	-1307834	128622	3868898	-61.8	-1.6	-47.0	4159431	0	-37.2774	31.8338

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APPENDIX C

TIME HISTORY OF TRAJECTORY PARAMETERS - ENGLISH UNITS

The postflight trajectory, from guidance reference release to LV-LTA/CSM physical separation, is tabulated in English units in Tables C-I through C-IX.

Table C-I gives the earth-fixed launch site position, velocity, and acceleration components for the ascent phase of flight.

Table C-II gives the geocentric inertial position, velocity, and acceleration components for the ascent phase of flight.

Table C-III gives the geographic polar coordinates for the ascent phase of flight.

Table C-IV gives the geographic polar coordinates for the orbital phase of flight.

Table C-V gives the earth-fixed launch site position, velocity, and acceleration components for the second burn phase of flight.

Table C-VI gives the geocentric inertial position, velocity, and acceleration components for the second burn phase of flight.

Table C-VII gives the geographic polar coordinates for the second burn phase of flight.

Table C-VIII gives the trajectory parameters for the S-IC spent stage.

Table C-IX gives the trajectory parameters for the S-II spent stage.

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TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
GUIDANCE REFERENCE RELEASE									
-16.570	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-16.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-15.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-14.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-13.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-12.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-11.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-10.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-9.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-8.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-7.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-6.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-5.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-4.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-3.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-2.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
-0.0	195	0	0	0.0	0.0	0.0	0.0	0.0	0.0
FIRST MOTION									
0.330	195	0	0	0.0	0.0	0.0	5.32	-0.05	0.01
IU UMBILICAL DISCONNECT									
0.670	196	0	0	2.2	-0.0	0.0	7.06	-0.08	0.02
1.0	197	0	0	4.8	-0.1	0.0	8.25	-0.12	0.05
2.0	206	0	0	13.1	-0.2	0.1	8.41	-0.19	0.11
3.0	223	0	0	21.6	-0.4	0.2	8.64	-0.05	0.18
4.0	249	-1	1	30.4	-0.2	0.4	8.88	0.54	0.13
5.0	284	-1	1	39.4	0.5	0.5	9.14	0.68	0.10
6.0	328	0	2	48.6	1.2	0.6	9.42	0.84	0.05
7.0	381	2	2	58.1	2.1	0.6	9.57	0.93	0.00
8.0	444	4	3	67.8	3.1	0.6	9.70	0.96	-0.02
9.0	517	8	3	77.6	4.0	0.6	9.93	0.97	-0.06
10.0	599	12	4	87.6	5.0	0.5	10.17	0.94	-0.10
11.0	692	18	5	97.9	5.9	0.4	10.41	0.80	-0.09
12.0	795	24	5	108.4	6.5	0.3	10.61	0.47	-0.02
13.0	909	31	5	119.1	6.8	0.4	10.78	0.17	0.15
14.0	1033	38	6	130.0	6.9	0.7	10.95	0.00	0.45

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
15.0	1169	45	7	141.1	6.9	1.3	11.17	0.00	0.79
16.0	1316	52	9	152.3	6.9	2.3	11.39	0.05	1.09
17.0	1474	58	11	163.9	7.0	3.5	11.69	0.10	1.36
18.0	1644	66	16	175.7	7.1	5.0	11.99	0.08	1.62
19.0	1825	73	21	187.9	7.2	6.7	12.32	0.02	1.89
20.0	2019	84	29	200.4	7.1	8.8	12.64	-0.08	2.23
21.0	2226	95	39	213.1	7.0	11.2	12.92	-0.11	2.64
22.0	2432	106	57	226.2	6.9	14.0	13.15	-0.13	3.02
23.0	2656	113	77	239.3	6.8	17.2	13.39	-0.12	3.44
24.0	2902	120	97	252.8	6.7	20.8	13.63	-0.10	3.86
25.0	3162	126	120	266.5	6.5	24.9	13.86	-0.10	4.30
26.0	3435	133	147	280.5	6.4	29.4	14.08	-0.15	4.77
27.0	3723	139	179	294.7	6.3	34.4	14.32	-0.17	5.21
28.0	4025	145	216	309.2	6.1	39.9	14.56	-0.17	5.66
29.0	4341	151	259	323.9	5.9	45.7	14.85	-0.18	6.09
30.0	4673	157	308	338.9	5.7	52.0	15.14	-0.18	6.52
31.0	5019	163	363	354.1	5.6	58.8	15.39	-0.18	6.93
32.0	5381	168	425	369.6	5.4	65.9	15.65	-0.16	7.33
33.0	5758	174	495	385.4	5.2	73.4	15.90	-0.14	7.71
34.0	6152	179	572	401.4	5.1	81.3	16.16	-0.12	8.08
35.0	6561	184	658	417.7	5.0	89.6	16.41	-0.10	8.53
36.0	6987	189	751	434.3	4.9	98.4	16.69	-0.10	9.05
37.0	7430	194	854	451.1	4.8	107.7	16.97	-0.10	9.60
38.0	7890	198	967	468.2	4.7	117.6	17.22	-0.09	10.17
39.0	8367	203	1090	485.5	4.6	128.1	17.48	-0.08	10.79
40.0	8861	208	1224	503.1	4.5	139.2	17.72	-0.06	11.41
41.0	9373	212	1369	521.0	4.5	150.9	17.97	-0.03	12.05
42.0	9903	217	1526	539.1	4.5	163.3	18.21	-0.01	12.66
43.0	10451	221	1695	557.4	4.4	176.2	18.42	-0.00	13.25
44.0	11018	226	1878	575.9	4.5	189.8	18.69	0.04	13.82
45.0	11603	230	2075	594.8	4.6	203.9	18.96	0.11	14.41
46.0	12207	235	2286	613.9	4.7	218.6	19.23	0.18	15.03
47.0	12831	240	2512	633.2	4.9	234.0	19.48	0.29	15.68
48.0	13474	245	2754	652.8	5.3	250.0	19.74	0.39	16.32
49.0	14137	250	3013	672.7	5.7	266.6	19.98	0.46	16.96
50.0	14820	256	3288	692.8	6.2	283.9	20.18	0.54	17.63
51.0	15522	263	3581	713.1	6.8	301.9	20.41	0.57	18.32
52.0	16246	270	3892	733.6	7.3	320.5	20.64	0.54	18.99
53.0	16990	277	4222	754.3	7.8	339.8	20.83	0.45	19.65
54.0	17754	285	4572	775.2	8.2	359.9	20.98	0.35	20.36
55.0	18540	294	4942	796.3	8.5	380.6	21.18	0.28	21.03
56.0	19347	302	5333	817.6	8.8	401.9	21.43	0.27	21.68
57.0	20175	311	5746	839.1	9.1	423.9	21.66	0.27	22.36

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
58.0	21026	320	6181	860.9	9.4	446.6	21.84	0.27	22.96
59.0	21897	330	6639	882.8	9.7	469.8	22.00	0.29	23.54
60.0	22791	340	7121	904.9	10.0	493.7	22.15	0.33	24.14
61.0	23707	350	7627	927.1	10.3	518.1	22.30	0.31	24.75
MACH 1									
61.450	24127	354	7863	937.1	10.4	529.3	22.33	0.29	25.01
62.0	24645	360	8157	949.4	10.5	543.2	22.37	0.25	25.38
63.0	25606	371	8713	971.8	10.7	568.9	22.46	0.20	26.02
64.0	26589	382	9295	994.3	10.9	595.2	22.57	0.11	26.70
65.0	27595	393	9904	1017.0	11.0	622.3	22.71	0.07	27.40
66.0	28623	404	10540	1039.9	11.1	650.0	22.93	0.10	28.14
67.0	29675	415	11204	1062.9	11.3	678.5	23.22	0.18	28.87
68.0	30749	426	11897	1086.3	11.5	707.8	23.53	0.28	29.61
69.0	31847	438	12620	1110.0	11.8	737.8	23.79	0.37	30.37
70.0	32969	450	13373	1133.9	12.3	768.4	24.09	0.51	31.09
71.0	34115	462	14157	1158.2	12.8	799.9	24.46	0.63	31.79
72.0	35286	476	14973	1182.8	13.4	832.1	24.78	0.68	32.56
73.0	36481	489	15822	1207.7	14.1	865.0	25.06	0.71	33.38
74.0	37701	504	16704	1232.9	14.9	898.9	25.29	0.78	34.23
75.0	38947	519	17620	1258.3	15.8	933.6	25.50	0.86	35.17
76.0	40218	535	18571	1283.9	16.7	969.3	25.69	0.93	36.22
77.0	41515	553	19559	1309.7	17.6	1006.1	25.82	0.95	37.37
78.0	42837	571	20584	1335.5	18.5	1044.1	25.88	0.94	38.60
MAXIMUM DYNAMIC PRESSURE									
78.900	44050	588	21540	1358.8	19.3	1079.4	25.84	0.90	39.79
79.0	44186	590	21647	1361.3	19.4	1083.3	25.83	0.90	39.93
80.0	45560	609	22751	1387.1	20.3	1123.9	25.71	0.82	41.32
81.0	46960	630	23896	1412.8	21.0	1166.0	25.59	0.72	42.74
82.0	48386	651	25083	1438.3	21.7	1209.5	25.42	0.64	44.25
83.0	49837	673	26315	1463.6	22.4	1254.5	25.21	0.58	45.76
84.0	51313	696	27592	1488.8	23.0	1300.9	25.03	0.56	47.25
85.0	52814	719	28917	1513.7	23.5	1348.9	24.86	0.59	48.69
86.0	54340	743	30291	1538.5	24.1	1398.3	24.76	0.57	50.09
87.0	55891	768	31714	1563.3	24.6	1449.1	24.72	0.50	51.47
88.0	57467	792	33189	1587.9	25.1	1501.2	24.66	0.40	52.80
89.0	59067	818	34717	1612.5	25.4	1554.6	24.60	0.28	54.04
90.0	60692	843	36299	1637.1	25.6	1609.3	24.59	0.17	55.27
91.0	62341	869	37936	1661.8	25.7	1665.2	24.63	0.05	56.47
92.0	64015	895	39630	1686.5	25.7	1722.2	24.70	-0.10	57.63

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
93.0	65714	920	41381	1711.1	25.5	1780.3	24.78	-0.24	58.71
94.0	67438	946	43191	1736.0	25.3	1839.6	24.84	-0.31	59.81
95.0	69186	971	45061	1760.9	24.9	1900.0	24.92	-0.34	60.95
96.0	70959	996	46991	1785.9	24.6	1961.5	25.02	-0.37	62.05
97.0	72758	1020	48984	1810.9	24.2	2024.2	25.09	-0.34	63.20
98.0	74581	1044	51040	1836.0	23.9	2087.9	25.12	-0.31	64.35
99.0	76430	1068	53160	1861.1	23.7	2152.8	25.20	-0.24	65.51
100.0	78303	1091	55346	1886.4	23.4	2218.9	25.27	-0.19	66.64
101.0	80202	1115	57599	1911.7	23.2	2286.1	25.34	-0.15	67.76
102.0	82127	1138	59919	1937.1	23.1	2354.5	25.45	-0.12	68.95
103.0	84077	1161	62308	1962.6	23.0	2424.0	25.51	-0.13	70.16
104.0	86052	1184	64767	1988.1	22.9	2494.8	25.54	-0.16	71.36
105.0	88053	1207	67298	2013.6	22.7	2566.8	25.53	-0.20	72.62
106.0	90079	1229	69901	2039.1	22.4	2640.1	25.48	-0.25	73.92
107.0	92131	1251	72578	2064.5	22.1	2714.6	25.35	-0.30	75.27
108.0	94208	1273	75331	2089.7	21.8	2790.6	25.16	-0.40	76.59
109.0	96311	1295	78160	2114.8	21.3	2867.9	24.97	-0.50	77.95
110.0	98438	1316	81067	2139.7	20.8	2946.6	24.84	-0.56	79.36
111.0	100590	1337	84054	2164.6	20.2	3026.6	24.78	-0.61	80.77
112.0	102767	1356	87121	2189.3	19.6	3108.1	24.73	-0.62	82.14
113.0	104969	1376	90270	2214.0	19.0	3190.8	24.74	-0.58	83.45
114.0	107195	1395	93503	2238.9	18.5	3274.8	24.87	-0.51	84.68
115.0	109446	1413	96820	2263.9	18.0	3360.1	25.10	-0.41	85.86
116.0	111723	1430	100223	2289.1	17.6	3446.5	25.36	-0.32	87.03
117.0	114025	1447	103714	2314.6	17.3	3534.2	25.66	-0.30	88.20
118.0	116353	1465	107292	2340.4	17.3	3622.9	25.95	-0.28	89.36
119.0	118707	1483	110960	2366.5	17.1	3712.9	26.27	-0.26	90.62
120.0	121085	1500	114719	2392.9	17.1	3804.2	26.60	-0.25	91.96
121.0	123492	1517	118570	2419.7	17.1	3896.8	26.93	-0.24	93.29
122.0	125927	1533	122513	2446.8	17.1	3990.8	27.26	-0.22	94.63
123.0	128389	1551	126553	2474.2	17.1	4086.1	27.51	-0.22	95.97
124.0	130877	1568	130686	2501.8	17.1	4182.7	27.77	-0.21	97.30
125.0	133394	1585	134919	2529.7	16.8	4280.7	28.03	-0.20	98.64
S-IC INBOARD ENGINE CUTOFF									
125.880	135632	1600	138728	2554.5	16.7	4368.0	28.25	-0.19	99.82
126.0	135938	1602	139251	2557.9	16.7	4380.0	28.25	-0.19	99.75
127.0	138505	1618	143674	2578.4	16.5	4468.0	15.46	-0.19	80.72
128.0	141092	1634	148186	2593.9	16.1	4549.3	15.54	-0.18	81.81
129.0	143694	1651	152778	2609.4	15.9	4631.6	15.62	-0.18	82.90
130.0	146310	1667	157449	2625.1	15.8	4715.1	15.70	-0.17	83.99
131.0	148943	1682	162207	2640.8	15.5	4799.6	15.83	-0.17	85.08

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
132.0	151592	1697	167050	2656.7	15.5	4885.2	15.96	-0.16	86.17
133.0	154256	1713	171979	2672.8	15.4	4971.9	16.10	-0.15	87.26
134.0	156937	1728	176995	2688.9	14.4	5059.7	16.21	-0.12	88.35
135.0	159634	1743	182100	2705.2	15.1	5148.7	16.33	0.06	89.57
136.0	162347	1758	187293	2721.6	15.2	5239.1	16.44	0.08	90.87
137.0	165076	1773	192578	2737.7	15.2	5330.6	16.58	0.09	92.08
138.0	167822	1788	197955	2754.3	15.3	5423.4	16.72	0.09	93.32
139.0	170585	1804	203425	2771.1	15.3	5517.3	16.87	0.01	94.59
140.0	173364	1819	208990	2788.1	15.3	5612.5	17.01	-0.09	95.84
141.0	176161	1834	214650	2805.2	15.3	5709.0	17.18	-0.15	97.15
142.0	178975	1850	220408	2822.4	15.1	5806.8	17.32	-0.14	98.52
143.0	181806	1865	226265	2839.8	15.0	5906.0	17.51	-0.10	99.86
144.0	184655	1879	232220	2857.4	14.9	6006.6	17.73	-0.02	101.23
145.0	187521	1895	238278	2875.3	14.9	6108.5	18.06	0.02	102.60
146.0	190405	1910	244440	2893.5	15.2	6211.8	18.38	0.04	103.97
147.0	193308	1924	250704	2911.9	15.0	6316.4	18.71	0.05	105.35
148.0	196230	1939	257072	2930.7	15.2	6422.4	18.99	0.07	106.72
149.0	199171	1956	263550	2950.0	15.4	6529.8	19.69	0.09	108.09
150.0	202130	1971	270135	2970.1	15.6	6638.6	20.40	0.11	109.46
151.0	205110	1987	276829	2990.8	15.7	6748.7	21.05	0.12	110.83
152.0	208128	2002	283673	3012.2	15.9	6860.3	21.75	0.15	112.20
153.0	211150	2017	290591	3034.3	15.9	6973.1	22.44	0.19	113.57
	S-IC OUTBOARD ENGINE CUTOFF								
153.820	213642	2031	296344	3052.9	16.2	7066.7	22.99	0.29	114.66
154.0	214189	2034	297612	3055.1	16.3	7084.1	4.47	0.31	79.39
	S-IC/S-II SEPARATION COMMAND								
154.470	215612	2042	300923	3047.9	16.5	7100.8	-29.66	0.34	1.89
156.0	220227	2068	311760	3002.5	17.0	7103.7	-29.66	0.37	1.86
158.0	226168	2103	325960	2947.3	17.9	7114.7	-22.81	0.40	12.77
160.0	232027	2138	340240	2903.3	18.5	7148.5	-21.32	0.43	19.31
162.0	237787	2177	354571	2862.2	19.5	7189.3	-20.01	0.46	21.65
164.0	243473	2217	368993	2822.7	20.5	7233.0	-19.68	0.48	21.98
166.0	249078	2258	383505	2783.5	21.4	7278.0	-19.30	0.51	22.66
168.0	254607	2302	398106	2745.0	22.5	7323.5	-19.14	0.53	22.96
170.0	260058	2348	412799	2706.8	23.6	7369.4	-19.15	0.56	22.93
172.0	265434	2397	427584	2668.5	24.7	7415.3	-19.06	0.54	23.04
174.0	270733	2447	442461	2630.5	25.8	7461.6	-18.96	0.56	23.16
176.0	275956	2500	457430	2592.7	26.9	7508.0	-18.89	0.57	23.29
178.0	281103	2555	472493	2555.0	28.0	7554.7	-18.80	0.58	23.41

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
180.0	286176	2612	487649	2517.5	29.2	7601.6	-18.72	0.55	23.46
182.0	291173	2671	502899	2480.1	30.3	7648.6	-18.64	0.56	23.53
184.0	296096	2733	518243	2442.9	31.4	7695.7	-18.57	0.61	23.68
186.0	300945	2797	533682	2405.8	32.7	7743.3	-18.47	0.60	23.84
188.0	305720	2864	549217	2369.0	33.9	7791.2	-18.39	0.61	24.04
190.0	310421	2933	564847	2332.4	35.1	7839.4	-18.20	0.61	24.17
192.0	315050	3004	580574	2296.3	36.3	7887.8	-17.96	0.64	24.25
194.0	319606	3078	596398	2260.4	37.6	7936.4	-17.86	0.62	24.32
196.0	324091	3154	612320	2224.5	38.8	7985.2	-18.00	0.60	24.49
198.0	328504	3233	628339	2188.4	40.0	8034.2	-18.16	0.60	24.61
200.0	332845	3314	644457	2152.1	41.2	8083.6	-18.12	0.62	24.72
202.0	337113	3398	660674	2116.0	42.4	8133.2	-17.96	0.63	24.84
204.0	341309	3484	676990	2080.1	43.7	8183.0	-17.90	0.61	25.02
206.0	345433	3573	693406	2044.3	44.9	8233.1	-17.94	0.58	25.09
208.0	349486	3664	709923	2008.4	46.1	8283.4	-17.95	0.61	25.20
210.0	353467	3757	726540	1972.5	47.3	8333.9	-17.92	0.65	25.30
212.0	357376	3853	743258	1936.7	48.6	8384.6	-17.90	0.66	25.43
214.0	361214	3952	760079	1900.9	49.9	8435.6	-17.92	0.65	25.55
216.0	364980	4053	777001	1865.1	51.2	8486.8	-17.88	0.65	25.65
218.0	368674	4157	794026	1829.3	52.5	8538.3	-17.90	0.65	25.80
220.0	372297	4263	811154	1793.6	53.8	8590.0	-17.86	0.64	25.92
222.0	375849	4372	828386	1757.9	55.1	8641.9	-17.82	0.67	26.04
224.0	379329	4484	845722	1722.3	56.5	8694.2	-17.82	0.70	26.20
226.0	382738	4598	863163	1686.6	57.9	8746.7	-17.83	0.72	26.32
228.0	386075	4715	880709	1650.9	59.3	8799.4	-17.84	0.68	26.43
230.0	389342	4835	898361	1615.3	60.7	8852.4	-17.83	0.67	26.54
232.0	392537	4958	916119	1579.6	62.0	8905.7	-17.80	0.69	26.69
234.0	395660	5083	933984	1544.0	63.4	8959.2	-17.81	0.71	26.86
236.0	398713	5212	951956	1508.5	64.9	9013.0	-17.79	0.72	26.99
238.0	401694	5343	970036	1472.9	66.3	9067.1	-17.77	0.70	27.07
240.0	404604	5477	988225	1437.3	67.7	9121.4	-17.77	0.72	27.19
242.0	407443	5613	1006522	1401.8	69.1	9175.9	-17.77	0.73	27.39
244.0	410211	5753	1024929	1366.3	70.6	9230.9	-17.79	0.73	27.56
246.0	412908	5896	1043445	1330.7	72.1	9286.1	-17.76	0.76	27.67
248.0	415534	6042	1062073	1295.2	73.6	9341.6	-17.77	0.76	27.81
250.0	418089	6190	1080812	1259.6	75.1	9397.4	-17.75	0.78	27.96
252.0	420573	6342	1099663	1224.1	76.7	9453.4	-17.76	0.78	28.11
254.0	422985	6497	1118626	1188.6	78.2	9509.8	-17.79	0.79	28.23
256.0	425327	6655	1137702	1153.0	79.8	9566.4	-17.79	0.81	28.39
258.0	427597	6816	1156892	1117.4	81.4	9623.3	-17.77	0.79	28.56
260.0	429797	6981	1176196	1081.9	83.0	9680.6	-17.75	0.79	28.67
262.0	431925	7148	1195614	1046.4	84.6	9738.1	-17.71	0.80	28.85
264.0	433983	7319	1215149	1011.0	86.2	9796.0	-17.75	0.81	29.02

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
266.0	435969	7493	1234799	975.5	87.9	9854.2	-17.78	0.81	29.16
268.0	437884	7671	1254565	939.9	89.5	9912.6	-17.81	0.85	29.30
270.0	439728	7851	1274449	904.2	91.2	9971.4	-17.81	0.87	29.47
272.0	441501	8036	1294451	868.6	92.9	10030.6	-17.82	0.87	29.68
274.0	443203	8223	1314572	833.0	94.7	10090.1	-17.82	0.88	29.85
276.0	444833	8415	1334812	797.3	96.5	10149.9	-17.83	0.89	29.98
278.0	446392	8609	1355172	761.7	98.3	10210.1	-17.82	0.88	30.21
280.0	447880	8808	1375652	726.1	100.1	10270.7	-17.82	0.90	30.38
282.0	449296	9009	1396255	690.4	101.8	10331.6	-17.81	0.90	30.50
284.0	450642	9215	1416979	654.7	103.7	10392.7	-17.85	0.91	30.64
286.0	451915	9424	1437826	619.0	105.5	10454.2	-17.86	0.96	30.81
288.0	453118	9637	1458796	583.2	107.4	10516.0	-17.93	0.94	31.02
290.0	454248	9854	1479890	547.4	109.3	10578.2	-17.92	0.96	31.18
292.0	455307	10074	1501109	511.5	111.2	10640.8	-17.97	0.93	31.35
294.0	456294	10299	1522453	475.5	113.1	10703.6	-17.95	0.96	31.55
296.0	457210	10527	1543924	439.7	115.0	10766.9	-17.95	0.99	31.71
298.0	458053	10759	1565521	403.8	117.0	10830.5	-17.92	0.99	31.92
300.0	458825	10995	1587246	367.9	119.0	10894.6	-17.98	0.99	32.12
302.0	459525	11235	1609099	331.9	121.0	10959.0	-18.01	1.00	32.29
304.0	460152	11479	1631082	295.9	123.1	11023.8	-18.05	1.05	32.48
306.0	460708	11727	1653195	259.8	125.2	11089.0	-18.07	1.06	32.72
308.0	461192	11980	1675438	223.6	127.3	11154.5	-18.06	1.09	32.92
310.0	461603	12236	1697813	187.5	129.5	11220.6	-18.11	1.06	33.08
312.0	461941	12497	1720321	151.2	131.6	11286.9	-18.13	1.06	33.27
314.0	462207	12763	1742961	114.9	133.7	11353.6	-18.19	1.05	33.45
316.0	462401	13032	1765735	78.5	135.8	11420.7	-18.24	1.10	33.65
318.0	462521	13306	1788644	42.0	138.0	11488.2	-18.24	1.09	33.86
320.0	462569	13584	1811688	5.5	140.3	11556.2	-18.23	1.14	34.08
322.0	462543	13867	1834869	-31.0	142.5	11624.5	-18.29	1.13	34.30
324.0	462445	14155	1858187	-67.6	144.8	11693.4	-18.33	1.15	34.51
326.0	462273	14447	1881643	-104.3	147.1	11762.6	-18.36	1.17	34.74
328.0	462027	14743	1905238	-141.1	149.5	11832.2	-18.39	1.15	34.92
330.0	461708	15044	1928972	-177.9	151.8	11902.3	-18.41	1.16	35.11
332.0	461316	15350	1952847	-214.7	154.1	11972.8	-18.46	1.19	35.38
334.0	460849	15661	1976864	-251.7	156.5	12043.8	-18.49	1.21	35.65
336.0	460309	15976	2001023	-288.7	158.9	12115.3	-18.53	1.24	35.87
338.0	459694	16297	2025325	-325.9	161.4	12187.2	-18.62	1.21	36.05
340.0	459005	16622	2049772	-363.1	163.8	12259.6	-18.65	1.23	36.28
342.0	458242	16952	2074364	-400.5	166.3	12332.3	-18.69	1.26	36.51
344.0	457403	17287	2099101	-437.9	168.9	12405.6	-18.71	1.29	36.78
346.0	456490	17628	2123986	-475.3	171.4	12479.4	-18.73	1.30	37.01
348.0	455502	17973	2149019	-512.8	174.1	12553.6	-18.79	1.32	37.26
350.0	454439	18324	2174201	-550.5	176.8	12628.4	-18.88	1.35	37.51

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
352.0	453300	18680	2199533	-588.3	179.4	12703.6	-18.93	1.36	37.70
354.0	452085	19042	2225016	-626.3	182.2	12779.3	-19.01	1.36	37.97
356.0	450795	19409	2250651	-664.3	184.9	12855.5	-19.02	1.38	38.23
358.0	449428	19782	2276439	-702.4	187.7	12932.2	-19.06	1.39	38.51
360.0	447985	20160	2302380	-740.5	190.5	13009.5	-19.12	1.42	38.75
362.0	446466	20544	2328477	-778.9	193.3	13087.2	-19.20	1.42	38.95
364.0	444870	20933	2354729	-817.3	196.2	13165.4	-19.26	1.45	39.23
366.0	443197	21328	2381139	-855.8	199.1	13244.2	-19.28	1.46	39.55
368.0	441447	21729	2407706	-894.5	202.0	13323.5	-19.33	1.44	39.77
370.0	439619	22136	2434433	-933.2	204.9	13403.3	-19.43	1.46	40.03
372.0	437714	22549	2461320	-972.1	207.9	13483.6	-19.48	1.51	40.28
374.0	435730	22968	2488368	-1011.1	210.9	13564.4	-19.54	1.50	40.57
376.0	433669	23393	2515578	-1050.3	213.9	13645.9	-19.59	1.54	40.90
378.0	431529	23824	2542952	-1089.5	217.0	13728.0	-19.69	1.50	41.20
380.0	429311	24261	2570490	-1129.0	220.0	13810.7	-19.77	1.48	41.54
382.0	427013	24704	2598195	-1168.6	223.0	13894.1	-19.84	1.50	41.81
384.0	424636	25152	2626067	-1208.3	226.0	13978.0	-19.87	1.53	42.06
386.0	422180	25608	2654107	-1248.1	229.1	14062.4	-19.94	1.53	42.35
388.0	419644	26069	2682317	-1288.1	232.1	14147.4	-20.03	1.57	42.68
390.0	417027	26536	2710698	-1328.3	235.3	14233.1	-20.13	1.59	42.98
392.0	414330	27010	2739250	-1368.6	238.5	14319.4	-20.20	1.61	43.32
394.0	411553	27490	2767975	-1409.1	241.8	14406.3	-20.29	1.64	43.63
396.0	408694	27977	2796876	-1449.7	245.1	14494.0	-20.37	1.69	44.03
398.0	405754	28471	2825952	-1490.6	248.5	14582.4	-20.44	1.68	44.40
400.0	402732	28971	2855206	-1531.6	251.9	14671.4	-20.53	1.70	44.65
402.0	399627	29478	2884638	-1572.7	255.2	14761.1	-20.64	1.68	44.96
404.0	396441	29992	2914250	-1614.0	258.6	14851.3	-20.71	1.71	45.28
406.0	393171	30512	2944044	-1655.6	262.1	14942.2	-20.80	1.76	45.66
408.0	389818	31040	2974020	-1697.2	265.6	15033.9	-20.88	1.77	46.04
410.0	386382	31575	3004180	-1739.1	269.1	15126.3	-20.97	1.80	46.38
412.0	382862	32117	3034525	-1781.2	272.8	15219.4	-21.09	1.81	46.72
414.0	379257	32666	3065058	-1823.5	276.4	15313.2	-21.21	1.80	47.08
416.0	375568	33222	3095779	-1866.0	280.0	15407.7	-21.31	1.84	47.44
418.0	371793	33786	3126689	-1908.7	283.7	15503.1	-21.40	1.88	47.89
420.0	367933	34357	3157792	-1951.6	287.5	15599.2	-21.49	1.89	48.27
422.0	363987	34936	3189087	-1994.7	291.2	15696.2	-21.57	1.88	48.67
424.0	359954	35522	3220577	-2037.9	295.1	15793.8	-21.68	1.93	49.02
426.0	355835	36116	3252263	-2081.4	299.0	15892.3	-21.79	2.00	49.43
428.0	351629	36718	3284146	-2125.1	303.0	15991.6	-21.92	2.02	49.89
430.0	347335	37328	3316230	-2169.0	307.1	16091.9	-22.07	2.03	50.36
432.0	342952	37946	3348515	-2213.3	311.1	16193.0	-22.18	2.02	50.74
434.0	338481	38573	3381002	-2257.9	315.2	16294.4	-22.29	2.00	51.16
436.0	333921	39207	3413694	-2302.6	319.1	16397.1	-22.40	1.99	51.59

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
438.0	329271	39850	3446594	-2347.5	323.3	16500.7	-22.52	1.99	52.01
440.0	324532	40500	3479698	-2392.6	327.6	16605.1	-22.63	1.98	52.44
442.0	319701	41159	3513016	-2438.0	331.5	16710.4	-22.75	1.97	52.86
444.0	314779	41827	3546543	-2483.6	335.8	16816.5	-22.86	1.97	53.29
446.0	309766	42503	3580284	-2529.6	340.3	16922.4	-23.48	1.96	49.51
448.0	304658	43187	3614216	-2577.8	344.2	17010.2	-24.41	1.95	41.39
450.0	299454	43879	3648320	-2626.9	348.1	17093.0	-24.68	1.95	41.45
452.0	294152	44580	3682589	-2676.5	352.2	17175.9	-24.95	1.94	41.51
454.0	288748	45288	3717025	-2726.7	355.9	17259.0	-25.22	1.93	41.57
456.0	283245	46003	3751628	-2777.2	359.8	17342.9	-25.40	1.93	41.75
458.0	277639	46727	3786397	-2828.1	363.7	17426.7	-25.49	1.97	42.04
460.0	271932	47458	3821335	-2879.1	367.7	17511.0	-25.55	2.02	42.30
462.0	266123	48198	3856441	-2930.4	371.8	17595.8	-25.69	2.08	42.48
464.0	260211	48945	3891718	-2981.9	376.0	17681.0	-25.80	2.10	42.68
466.0	254195	49702	3927166	-3033.6	380.2	17766.7	-25.96	2.13	43.03
468.0	248076	50466	3962785	-3085.7	384.5	17853.0	-26.11	2.15	43.37
470.0	241852	51240	3998578	-3138.0	388.8	17940.1	-26.22	2.18	43.67
472.0	235524	52022	4034546	-3190.6	393.2	18027.7	-26.37	2.20	43.93
474.0	229090	52812	4070689	-3243.4	397.6	18115.8	-26.45	2.19	44.15
476.0	222550	53612	4107010	-3296.5	402.0	18204.4	-26.59	2.23	44.44
478.0	215904	54420	4143507	-3349.8	406.6	18293.6	-26.72	2.32	44.77
480.0	209150	55238	4180184	-3403.3	411.3	18383.5	-26.82	2.39	45.12
482.0	202290	56066	4217042	-3457.1	416.1	18473.9	-26.95	2.45	45.32
484.0	195322	56903	4254080	-3511.2	421.0	18564.7	-27.15	2.41	45.51
486.0	188245	57749	4291301	-3565.6	425.8	18656.0	-27.30	2.43	45.73
488.0	181059	58606	4328705	-3620.4	430.7	18747.8	-27.49	2.42	46.07
490.0	173763	59472	4366293	-3675.6	435.5	18840.2	-27.67	2.43	46.40
492.0	166357	60348	4404066	-3731.1	440.4	18933.3	-27.81	2.45	46.68
494.0	158839	61234	4442026	-3786.9	445.4	19027.1	-28.03	2.49	47.09
496.0	151209	62130	4480175	-3843.2	450.4	19121.9	-28.23	2.53	47.66
498.0	143466	63035	4518514	-3899.9	455.5	19217.7	-28.47	2.56	48.17
500.0	135609	63952	4557046	-3956.9	460.7	19314.2	-28.60	2.65	48.36
502.0	127638	64878	4595771	-4014.1	466.0	19410.9	-28.58	2.68	48.34
504.0	119552	65816	4634690	-4071.4	471.4	19507.8	-28.65	2.68	48.49
506.0	111352	66764	4673803	-4128.9	476.7	19605.3	-28.86	2.63	49.01
508.0	103037	67722	4713112	-4186.9	481.9	19703.9	-29.18	2.61	49.61
510.0	94604	68692	4752619	-4245.5	487.2	19803.5	-29.42	2.68	50.06
512.0	86055	69671	4792326	-4304.4	492.7	19904.0	-29.50	2.74	50.42
514.0	77387	70662	4832235	-4363.5	498.2	20004.9	-29.62	2.79	50.81
516.0	68600	71664	4872348	-4422.9	503.8	20107.0	-29.73	2.81	51.26
518.0	59693	72677	4912665	-4482.4	509.4	20209.9	-29.74	2.83	51.72
520.0	50670	73702	4953190	-4541.9	515.0	20313.8	-29.75	2.85	52.18
522.0	41524	74739	4993945	-4601.4	520.8	20418.6	-29.75	2.87	52.63

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
524.0	32261	75785	5034885	-4660.9	526.3	20524.3	-29.76	2.05	53.09
S-II ENGINE CUTOFF									
524.040	32074	75806	5035705	-4662.0	526.4	20526.3	-29.76	2.02	53.10
S-II/S-IVB SEPARATION COMMAND									
524.900	28054	76260	5053352	-4685.9	527.9	20533.6	-27.07	1.79	-6.19
526.0	22885	76842	5075912	-4715.7	529.9	20526.8	-27.07	1.80	-6.19
528.0	13397	77905	5116954	-4769.8	533.0	20514.7	-27.09	1.82	-4.94
530.0	3805	78975	5157982	-4824.0	536.3	20512.0	-27.17	1.84	6.23
532.0	-5899	80051	5199025	-4878.5	540.2	20530.3	-27.34	1.86	10.29
534.0	-15711	81135	5240106	-4933.4	544.1	20551.8	-27.57	1.88	11.18
536.0	-25635	82227	5281235	-4989.5	547.8	20574.7	-28.07	1.90	11.47
538.0	-35671	83326	5322407	-5046.4	551.6	20597.6	-28.75	1.92	11.39
540.0	-45821	84433	5363625	-5104.6	555.4	20620.5	-29.49	1.90	11.55
542.0	-56090	85548	5404889	-5164.2	559.3	20643.6	-30.08	1.94	11.54
544.0	-66479	86670	5446199	-5224.8	563.2	20666.6	-30.46	1.97	11.49
546.0	-76989	87801	5487556	-5285.8	567.1	20689.6	-30.56	2.00	11.41
548.0	-87622	88939	5528958	-5346.8	571.1	20712.4	-30.46	1.96	11.43
550.0	-98376	90085	5570405	-5407.7	574.9	20735.2	-30.35	1.92	11.49
552.0	-109252	91239	5611899	-5468.4	578.8	20758.2	-30.37	1.94	11.45
554.0	-120250	92400	5653438	-5529.2	582.7	20781.0	-30.49	1.99	11.32
556.0	-131369	93570	5695022	-5590.3	586.8	20803.6	-30.59	2.05	11.27
558.0	-142611	94747	5736652	-5651.4	590.9	20826.1	-30.58	2.06	11.21
560.0	-153975	95933	5778327	-5712.6	595.0	20848.5	-30.57	2.03	11.20
562.0	-165461	97127	5820046	-5773.8	599.0	20870.8	-30.61	2.05	11.17
564.0	-177070	98329	5861810	-5835.0	603.2	20893.1	-30.60	2.04	11.16
566.0	-188802	99540	5903619	-5896.2	607.3	20915.5	-30.63	2.10	11.19
568.0	-200655	100759	5945472	-5957.5	611.5	20937.9	-30.59	2.10	11.22
570.0	-212631	101986	5987370	-6018.6	615.7	20960.3	-30.55	2.11	11.21
572.0	-224730	103221	6029313	-6079.7	619.9	20982.8	-30.59	2.12	11.22
574.0	-236950	104466	6071301	-6140.9	624.2	21005.2	-30.63	2.13	11.21
576.0	-249293	105718	6113334	-6202.1	628.4	21027.6	-30.60	2.13	11.23
578.0	-261759	106979	6155412	-6263.3	632.7	21050.1	-30.61	2.14	11.22
580.0	-274347	108249	6197534	-6324.7	637.0	21072.5	-30.64	2.16	11.22
582.0	-287057	109527	6239702	-6385.9	641.3	21094.9	-30.69	2.14	11.19
584.0	-299891	110814	6281914	-6447.3	645.6	21117.3	-30.71	2.14	11.17
586.0	-312847	112110	6324171	-6508.7	649.9	21139.6	-30.68	2.15	11.14
588.0	-325926	113414	6366473	-6570.0	654.3	21161.9	-30.62	2.18	11.16
590.0	-339127	114727	6408819	-6631.3	658.6	21184.3	-30.60	2.20	11.21
592.0	-352451	116048	6451210	-6692.5	663.0	21206.8	-30.65	2.17	11.29

TABLE C-1. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
594.0	-365897	117379	6493646	-6753.9	667.3	21229.4	-30.70	2.17	11.33
596.0	-379466	118718	6536127	-6815.3	671.7	21252.1	-30.71	2.18	11.35
598.0	-393158	120065	6578654	-6876.7	676.0	21274.7	-30.70	2.17	11.33
600.0	-406973	121422	6621226	-6938.2	680.4	21297.4	-30.74	2.20	11.31
602.0	-420911	122787	6663844	-6999.7	684.8	21320.0	-30.82	2.20	11.31
604.0	-434972	124161	6706506	-7061.3	689.2	21342.6	-30.81	2.20	11.30
606.0	-449156	125544	6749214	-7122.9	693.6	21365.2	-30.75	2.19	11.29
608.0	-463464	126935	6791967	-7184.4	697.9	21387.8	-30.74	2.19	11.26
610.0	-477894	128335	6834765	-7245.8	702.3	21410.2	-30.71	2.15	11.21
612.0	-492447	129744	6877608	-7307.2	706.7	21432.6	-30.67	2.21	11.17
614.0	-507123	131162	6920496	-7368.5	711.1	21455.0	-30.61	2.21	11.20
616.0	-521921	132588	6963428	-7429.8	715.5	21477.4	-30.61	2.18	11.22
618.0	-536842	134024	7006405	-7491.0	719.8	21499.8	-30.61	2.19	11.23
620.0	-551885	135468	7049427	-7552.0	724.2	21522.3	-30.52	2.18	11.22
622.0	-567050	136921	7092494	-7613.1	728.6	21544.8	-30.47	2.23	11.22
624.0	-582337	138382	7135606	-7674.1	733.1	21567.3	-30.52	2.24	11.27
626.0	-597746	139853	7178764	-7735.2	737.5	21589.8	-30.56	2.21	11.28
628.0	-613277	141332	7221966	-7796.2	741.9	21612.3	-30.51	2.20	11.23
630.0	-628931	142821	7265213	-7857.2	746.4	21634.8	-30.46	2.23	11.26
632.0	-644706	144318	7308505	-7918.2	750.8	21657.3	-30.49	2.24	11.30
634.0	-660604	145824	7351842	-7979.2	755.3	21680.0	-30.57	2.24	11.39
636.0	-676623	147339	7395225	-8040.3	759.8	21702.8	-30.56	2.26	11.45
638.0	-692765	148863	7438653	-8101.5	764.3	21725.8	-30.57	2.22	11.46
640.0	-709029	150396	7482128	-8162.6	768.8	21748.8	-30.62	2.26	11.52
642.0	-725415	151938	7525648	-8223.9	773.3	21771.8	-30.61	2.22	11.53
644.0	-741924	153489	7569215	-8285.1	777.7	21794.8	-30.62	2.24	11.46
646.0	-758556	155049	7612827	-8346.3	782.2	21817.6	-30.59	2.27	11.37
648.0	-775310	156618	7656485	-8407.5	786.7	21840.3	-30.57	2.22	11.34
650.0	-792186	158196	7700189	-8468.7	791.2	21863.0	-30.57	2.25	11.39
652.0	-809184	159783	7743937	-8529.7	795.7	21885.8	-30.52	2.24	11.42
654.0	-826305	161379	7787732	-8590.6	800.2	21908.8	-30.33	2.26	11.52
656.0	-843546	162984	7831573	-8651.0	804.7	21932.0	-30.12	2.30	11.65
658.0	-860908	164598	7875460	-8711.1	809.4	21955.4	-29.94	2.28	11.73
660.0	-878390	166221	7919394	-8771.0	813.9	21978.8	-29.95	2.32	11.75
662.0	-895992	167854	7963375	-8830.9	818.6	22002.3	-30.00	2.31	11.71
664.0	-913714	169496	8007403	-8890.9	823.2	22025.7	-30.02	2.29	11.71
666.0	-931556	171147	8051478	-8951.0	827.8	22049.1	-30.00	2.30	11.71
668.0	-949518	172807	8095600	-9010.9	832.4	22072.6	-29.97	2.30	11.78
670.0	-967600	174476	8139769	-9070.9	837.0	22096.3	-29.96	2.30	11.85
672.0	-985801	176155	8183985	-9130.8	841.6	22120.0	-29.98	2.31	11.89
674.0	-1004123	177843	8228248	-9190.8	846.2	22143.7	-29.98	2.30	11.85
676.0	-1022565	179540	8272560	-9250.7	850.8	22167.4	-29.98	2.30	11.82
678.0	-1041126	181246	8316918	-9310.7	855.5	22191.0	-29.99	2.31	11.82

TABLE C-I. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
680.0	-1059807	182962	8361324	-9370.7	860.1	22214.6	-29.99	2.31	11.81
682.0	-1078610	184687	8405776	-9430.7	864.8	22238.2	-29.99	2.31	11.82
684.0	-1097530	186421	8450276	-9490.6	869.6	22261.8	-29.99	2.31	11.81
S-IVB FIRST GUIDANCE CUTOFF									
684.980	-1106846	187273	8472097	-9520.0	871.8	22273.4	-29.99	2.20	11.81
686.0	-1116569	188163	8494809	-9547.0	873.6	22268.1	-25.13	1.93	-11.01
688.0	-1135712	189915	8539319	-9597.2	877.1	22246.1	-25.09	1.64	-11.02
690.0	-1154954	191672	8583787	-9647.4	880.4	22224.0	-25.06	1.64	-11.04
692.0	-1174299	193437	8628213	-9697.5	883.8	22201.9	-25.03	1.64	-11.06
694.0	-1193743	195209	8672594	-9747.5	887.1	22179.7	-25.00	1.64	-11.08
PARKING ORBIT INSERTION									
694.980	-1203319	196075	8694321	-9771.4	888.8	22168.6	-24.98	1.67	-11.08

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
GUIDANCE REFERENCE RELEASE									
-16.970	-1162.940	2793.417	1639.264	-1237.7	-515.3	0.0	0.04	-0.09	0.0
-16.0	-1163.138	2793.335	1639.264	-1237.7	-515.4	0.0	0.04	-0.09	0.0
-15.0	-1163.342	2793.250	1639.264	-1237.6	-515.5	0.0	0.04	-0.09	0.0
-14.0	-1163.545	2793.165	1639.264	-1237.6	-515.5	0.0	0.04	-0.09	0.0
-13.0	-1163.749	2793.081	1639.264	-1237.6	-515.6	0.0	0.04	-0.09	0.0
-12.0	-1163.953	2792.996	1639.264	-1237.5	-515.7	0.0	0.04	-0.09	0.0
-11.0	-1164.156	2792.911	1639.264	-1237.5	-515.8	0.0	0.04	-0.09	0.0
-10.0	-1164.360	2792.826	1639.264	-1237.4	-515.9	0.0	0.04	-0.09	0.0
-9.0	-1164.564	2792.741	1639.264	-1237.4	-516.0	0.0	0.04	-0.09	0.0
-8.0	-1164.767	2792.656	1639.264	-1237.4	-516.1	0.0	0.04	-0.09	0.0
-7.0	-1164.971	2792.571	1639.264	-1237.3	-516.2	0.0	0.04	-0.09	0.0
-6.0	-1165.175	2792.486	1639.264	-1237.3	-516.3	0.0	0.04	-0.09	0.0
-5.0	-1165.378	2792.401	1639.264	-1237.2	-516.4	0.0	0.04	-0.09	0.0
-4.0	-1165.582	2792.316	1639.264	-1237.2	-516.4	0.0	0.04	-0.09	0.0
-3.0	-1165.786	2792.231	1639.264	-1237.2	-516.5	0.0	0.04	-0.09	0.0
-2.0	-1165.989	2792.146	1639.264	-1237.1	-516.6	0.0	0.04	-0.09	0.0
-1.0	-1166.193	2792.061	1639.264	-1237.1	-516.7	0.0	0.04	-0.09	0.0
-0.0	-1166.396	2791.976	1639.264	-1237.1	-516.8	0.0	0.04	-0.09	0.0
FIRST MOTION									
0.330	-1166.464	2791.948	1639.264	-1237.0	-516.8	0.0	-1.75	4.20	2.59
IU UMBILICAL DISCONNECT									
0.670	-1166.533	2791.919	1639.264	-1237.8	-515.1	1.1	-2.33	5.59	3.45
1.0	-1166.600	2791.891	1639.264	-1238.6	-513.1	2.3	-2.74	6.53	4.07
2.0	-1166.804	2791.807	1639.264	-1241.4	-506.5	6.5	-2.82	6.61	4.22
3.0	-1167.009	2791.724	1639.266	-1244.3	-499.8	10.7	-3.02	6.80	4.22
4.0	-1167.214	2791.643	1639.268	-1247.5	-492.8	14.8	-3.32	7.19	3.84
5.0	-1167.419	2791.562	1639.271	-1250.9	-485.5	18.6	-3.46	7.46	3.84
6.0	-1167.625	2791.483	1639.274	-1254.4	-477.9	22.4	-3.59	7.76	3.82
7.0	-1167.832	2791.405	1639.278	-1258.0	-470.0	26.2	-3.64	7.93	3.80
8.0	-1168.040	2791.328	1639.283	-1261.7	-462.0	30.1	-3.68	8.06	3.83
9.0	-1168.247	2791.253	1639.288	-1265.4	-453.9	33.9	-3.74	8.27	3.93
10.0	-1168.456	2791.179	1639.294	-1269.1	-445.5	37.9	-3.77	8.47	4.06
11.0	-1168.665	2791.106	1639.300	-1272.9	-436.9	42.1	-3.79	8.62	4.29
12.0	-1168.875	2791.035	1639.308	-1276.7	-428.3	46.6	-3.77	8.65	4.68
13.0	-1169.085	2790.965	1639.316	-1280.5	-419.7	51.4	-3.84	8.61	5.06
14.0	-1169.296	2790.897	1639.325	-1284.4	-411.1	56.7	-4.07	8.54	5.37

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
15.0	-1169.508	2790.830	1639.334	-1288.7	-402.6	62.1	-4.42	8.55	5.56
16.0	-1169.721	2790.764	1639.345	-1293.3	-394.0	67.8	-4.77	8.59	5.70
17.0	-1169.934	2790.700	1639.357	-1298.2	-385.3	73.6	-5.11	8.71	5.88
18.0	-1170.148	2790.638	1639.369	-1303.5	-376.6	79.5	-5.42	8.82	6.11
19.0	-1170.363	2790.576	1639.383	-1309.0	-367.7	85.8	-5.73	8.93	6.39
20.0	-1170.579	2790.517	1639.397	-1314.9	-358.7	92.3	-6.07	8.99	6.72
21.0	-1170.796	2790.459	1639.412	-1321.2	-349.7	99.2	-6.49	8.99	6.99
22.0	-1171.015	2790.400	1639.428	-1327.9	-340.7	106.3	-6.88	8.98	7.21
23.0	-1171.234	2790.343	1639.445	-1334.9	-331.9	113.5	-7.31	8.96	7.44
24.0	-1171.454	2790.289	1639.465	-1342.4	-322.9	121.1	-7.74	8.95	7.65
25.0	-1171.676	2790.237	1639.485	-1350.3	-314.0	128.9	-8.18	8.92	7.88
26.0	-1171.899	2790.186	1639.507	-1358.7	-305.1	136.9	-8.63	8.84	8.15
27.0	-1172.123	2790.136	1639.530	-1367.6	-296.3	145.1	-9.06	8.80	8.40
28.0	-1172.349	2790.088	1639.555	-1376.9	-287.5	153.7	-9.51	8.77	8.64
29.0	-1172.576	2790.042	1639.581	-1386.6	-278.7	162.5	-9.96	8.78	8.91
30.0	-1172.805	2789.996	1639.608	-1396.8	-269.9	171.5	-10.41	8.80	9.16
31.0	-1173.036	2789.953	1639.637	-1407.4	-261.1	180.7	-10.84	8.79	9.39
32.0	-1173.269	2789.910	1639.668	-1418.5	-252.3	190.2	-11.27	8.80	9.60
33.0	-1173.503	2789.870	1639.700	-1429.9	-243.5	199.9	-11.67	8.82	9.80
34.0	-1173.739	2789.830	1639.734	-1441.8	-234.7	209.9	-12.08	8.84	10.02
35.0	-1173.978	2789.792	1639.769	-1454.1	-225.8	220.0	-12.54	8.82	10.24
36.0	-1174.218	2789.756	1639.806	-1466.9	-217.0	230.4	-13.07	8.78	10.52
37.0	-1174.461	2789.721	1639.845	-1480.3	-208.3	241.0	-13.61	8.73	10.80
38.0	-1174.705	2789.687	1639.886	-1494.2	-199.6	252.0	-14.18	8.64	11.07
39.0	-1174.952	2789.655	1639.928	-1508.6	-191.0	263.1	-14.78	8.54	11.34
40.0	-1175.202	2789.625	1639.972	-1523.7	-182.6	274.6	-15.38	8.43	11.61
41.0	-1175.454	2789.595	1640.018	-1539.4	-174.2	286.4	-16.01	8.31	11.88
42.0	-1175.709	2789.567	1640.066	-1555.7	-165.9	298.4	-16.60	8.20	12.13
43.0	-1175.966	2789.541	1640.117	-1572.6	-157.8	310.7	-17.16	8.07	12.39
44.0	-1176.226	2789.515	1640.169	-1590.0	-149.7	323.2	-17.74	8.01	12.64
45.0	-1176.490	2789.491	1640.223	-1608.1	-141.8	335.9	-18.35	7.95	12.87
46.0	-1176.756	2789.469	1640.279	-1626.8	-133.8	348.9	-18.98	7.87	13.10
47.0	-1177.025	2789.447	1640.338	-1646.1	-126.0	362.1	-19.66	7.77	13.32
48.0	-1177.298	2789.427	1640.398	-1666.1	-118.3	375.5	-20.31	7.68	13.53
49.0	-1177.573	2789.408	1640.461	-1686.7	-110.7	389.2	-20.96	7.57	13.75
50.0	-1177.853	2789.391	1640.527	-1708.0	-103.2	403.0	-21.61	7.42	13.97
51.0	-1178.136	2789.374	1640.594	-1729.9	-95.8	417.1	-22.27	7.25	14.23
52.0	-1178.422	2789.359	1640.664	-1752.5	-88.7	431.5	-22.88	7.09	14.55
53.0	-1178.713	2789.345	1640.736	-1775.6	-81.7	446.3	-23.45	6.88	14.89
54.0	-1179.007	2789.332	1640.811	-1799.4	-75.0	461.4	-24.04	6.60	15.24
55.0	-1179.305	2789.320	1640.888	-1823.7	-68.5	476.7	-24.63	6.40	15.57
56.0	-1179.607	2789.310	1640.968	-1848.7	-62.1	492.4	-25.25	6.26	15.87
57.0	-1179.913	2789.300	1641.050	-1874.2	-55.9	508.4	-25.87	6.10	16.17

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
58.0	-1180.224	2789.291	1641.135	-1900.4	-49.9	524.7	-26.43	5.94	16.42
59.0	-1180.539	2789.283	1641.223	-1927.1	-44.0	541.3	-26.98	5.78	16.64
60.0	-1180.858	2789.277	1641.313	-1954.3	-38.4	558.0	-27.54	5.60	16.83
61.0	-1181.182	2789.271	1641.407	-1982.1	-32.9	575.0	-28.08	5.40	17.09
MACH 1									
61.450	-1181.330	2789.268	1641.449	-1994.8	-30.5	582.7	-28.30	5.28	17.19
62.0	-1181.511	2789.266	1641.503	-2010.5	-27.7	592.2	-28.59	5.11	17.34
63.0	-1181.844	2789.262	1641.601	-2039.3	-22.7	609.7	-29.12	4.84	17.60
64.0	-1182.182	2789.258	1641.703	-2068.7	-18.0	627.4	-29.68	4.55	17.91
65.0	-1182.525	2789.256	1641.808	-2098.7	-13.5	645.5	-30.29	4.29	18.20
66.0	-1182.873	2789.254	1641.916	-2129.4	-9.3	663.8	-30.99	4.10	18.48
67.0	-1183.226	2789.253	1642.027	-2160.7	-5.3	682.4	-31.72	3.98	18.75
68.0	-1183.584	2789.252	1642.140	-2192.8	-1.4	701.3	-32.47	3.87	19.01
69.0	-1183.948	2789.252	1642.257	-2225.7	2.4	720.4	-33.23	3.73	19.26
70.0	-1184.317	2789.253	1642.378	-2259.2	6.2	739.8	-33.99	3.64	19.49
71.0	-1184.692	2789.254	1642.501	-2293.6	9.8	759.4	-34.74	3.61	19.76
72.0	-1185.072	2789.256	1642.628	-2328.7	13.3	779.4	-35.51	3.48	20.07
73.0	-1185.458	2789.259	1642.757	-2364.6	16.7	799.6	-36.29	3.29	20.40
74.0	-1185.850	2789.262	1642.891	-2401.3	19.9	820.1	-37.10	3.06	20.68
75.0	-1186.249	2789.265	1643.027	-2438.9	22.8	840.9	-37.98	2.77	20.97
76.0	-1186.653	2789.269	1643.168	-2477.4	25.4	862.0	-38.93	2.41	21.28
77.0	-1187.064	2789.273	1643.311	-2516.8	27.6	883.5	-39.93	1.93	21.64
78.0	-1187.482	2789.278	1643.458	-2557.2	29.2	905.4	-40.95	1.34	22.01
MAXIMUM DYNAMIC PRESSURE									
78.900	-1187.863	2789.283	1643.594	-2594.5	30.0	925.3	-41.89	0.68	22.34
79.0	-1187.906	2789.283	1643.609	-2598.7	30.1	927.6	-42.01	0.60	22.37
80.0	-1188.337	2789.288	1643.764	-2641.2	30.3	950.1	-43.06	-0.23	22.76
81.0	-1188.775	2789.293	1643.922	-2684.8	29.6	973.1	-44.14	-1.09	23.17
82.0	-1189.221	2789.298	1644.084	-2729.5	28.1	996.4	-45.28	-2.03	23.56
83.0	-1189.674	2789.302	1644.250	-2775.4	25.6	1020.2	-46.42	-2.99	23.92
84.0	-1190.134	2789.306	1644.420	-2822.4	22.2	1044.2	-47.57	-3.91	24.25
85.0	-1190.603	2789.309	1644.594	-2870.5	17.9	1068.6	-48.70	-4.78	24.54
86.0	-1191.079	2789.312	1644.772	-2919.7	12.7	1093.4	-49.80	-5.59	24.88
87.0	-1191.564	2789.314	1644.954	-2970.1	6.7	1118.4	-50.88	-6.35	25.29
88.0	-1192.057	2789.314	1645.140	-3021.5	-0.1	1143.9	-51.90	-7.12	25.70
89.0	-1192.559	2789.313	1645.330	-3073.8	-7.6	1169.8	-52.84	-7.85	26.11
90.0	-1193.069	2789.312	1645.525	-3127.1	-15.7	1196.2	-53.79	-8.51	26.53
91.0	-1193.588	2789.308	1645.724	-3181.4	-24.6	1223.0	-54.72	-9.14	26.97
92.0	-1194.116	2789.303	1645.927	-3236.6	-34.0	1250.1	-55.63	-9.73	27.44

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
93.0	-1194.653	2789.297	1646.135	-3292.6	-44.0	1277.8	-56.47	-10.27	27.89
94.0	-1195.200	2789.289	1646.348	-3349.5	-54.5	1305.9	-57.35	-10.82	28.27
95.0	-1195.756	2789.279	1646.565	-3407.4	-65.6	1334.3	-58.31	-11.35	28.65
96.0	-1196.321	2789.267	1646.787	-3466.2	-77.2	1363.2	-59.22	-11.86	29.01
97.0	-1196.897	2789.254	1647.014	-3525.9	-89.4	1392.3	-60.19	-12.38	29.33
98.0	-1197.482	2789.238	1647.246	-3586.5	-102.1	1421.8	-61.16	-12.95	29.63
99.0	-1198.077	2789.220	1647.482	-3648.2	-115.2	1451.5	-62.16	-13.46	29.92
100.0	-1198.683	2789.200	1647.723	-3710.8	-129.0	1481.6	-63.13	-13.98	30.21
101.0	-1199.299	2789.178	1647.970	-3774.4	-143.2	1512.0	-64.09	-14.50	30.52
102.0	-1199.925	2789.153	1648.221	-3839.0	-157.9	1542.7	-65.11	-15.02	30.87
103.0	-1200.563	2789.125	1648.478	-3904.7	-173.3	1573.8	-66.11	-15.60	31.23
104.0	-1201.211	2789.096	1648.739	-3971.3	-189.2	1605.2	-67.09	-16.21	31.59
105.0	-1201.870	2789.063	1649.006	-4038.9	-205.7	1636.9	-68.09	-16.89	31.96
106.0	-1202.540	2789.028	1649.278	-4107.5	-223.0	1669.1	-69.11	-17.62	32.33
107.0	-1203.222	2788.990	1649.555	-4177.0	-241.1	1701.6	-70.14	-18.45	32.68
108.0	-1203.915	2788.949	1649.838	-4247.7	-260.0	1734.4	-71.11	-19.32	33.03
109.0	-1204.620	2788.904	1650.126	-4319.3	-279.7	1767.6	-72.10	-20.21	33.38
110.0	-1205.337	2788.856	1650.420	-4392.0	-300.4	1801.2	-73.18	-21.06	33.74
111.0	-1206.066	2788.805	1650.719	-4465.7	-321.8	1835.2	-74.28	-21.86	34.14
112.0	-1206.807	2788.750	1651.024	-4540.5	-344.1	1869.5	-75.38	-22.62	34.49
113.0	-1207.560	2788.692	1651.334	-4616.4	-367.0	1904.1	-76.46	-23.28	34.82
114.0	-1208.327	2788.630	1651.651	-4693.4	-390.5	1939.1	-77.54	-23.79	35.16
115.0	-1209.105	2788.563	1651.973	-4771.5	-414.4	1974.4	-78.63	-24.20	35.50
116.0	-1209.897	2788.493	1652.301	-4850.6	-438.9	2010.1	-79.71	-24.57	35.87
117.0	-1210.702	2788.419	1652.635	-4930.9	-463.6	2046.2	-80.77	-24.94	36.30
118.0	-1211.520	2788.341	1652.974	-5012.3	-488.7	2082.5	-81.83	-25.31	36.74
119.0	-1212.352	2788.258	1653.320	-5094.7	-514.2	2119.4	-82.96	-25.71	37.22
120.0	-1213.197	2788.171	1653.672	-5178.3	-540.0	2156.7	-84.17	-26.14	37.72
121.0	-1214.057	2788.080	1654.030	-5263.2	-566.3	2194.5	-85.38	-26.57	38.23
122.0	-1214.930	2787.985	1654.394	-5349.3	-593.0	2232.8	-86.58	-27.00	38.74
123.0	-1215.818	2787.885	1654.765	-5436.6	-620.2	2271.5	-87.76	-27.49	39.22
124.0	-1216.720	2787.781	1655.142	-5525.0	-647.9	2310.8	-88.94	-27.98	39.69
125.0	-1217.637	2787.672	1655.526	-5614.5	-676.1	2350.8	-90.12	-28.47	40.17
S-IC INBOARD ENGINE CUTOFF									
125.880	-1218.456	2787.572	1655.869	-5694.3	-701.3	2386.2	-91.16	-28.91	40.59
126.0	-1218.568	2787.559	1655.916	-5705.3	-704.8	2391.1	-91.10	-28.88	40.57
127.0	-1219.514	2787.440	1656.312	-5784.1	-734.0	2424.9	-71.13	-29.51	29.31
128.0	-1220.472	2787.317	1656.714	-5855.6	-763.8	2454.4	-72.04	-30.01	29.64
129.0	-1221.442	2787.188	1657.121	-5928.1	-794.1	2484.3	-72.96	-30.52	29.97
130.0	-1222.423	2787.055	1657.532	-6001.5	-824.8	2514.4	-73.87	-31.03	30.30
131.0	-1223.417	2786.917	1657.948	-6075.8	-856.1	2544.9	-74.80	-31.49	30.65

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
132.0	-1224.423	2786.773	1658.370	-6151.1	-887.8	2575.7	-75.74	-31.96	31.00
133.0	-1225.442	2786.624	1658.796	-6227.4	-920.0	2606.7	-76.67	-32.42	31.35
134.0	-1226.473	2786.470	1659.228	-6304.1	-952.9	2639.0	-77.61	-32.89	31.67
135.0	-1227.517	2786.311	1659.665	-6382.6	-985.8	2670.1	-78.71	-33.38	31.90
136.0	-1228.574	2786.146	1660.107	-6462.0	-1019.6	2702.3	-79.82	-33.96	32.29
137.0	-1229.644	2785.975	1660.554	-6542.2	-1054.2	2734.6	-80.86	-34.49	32.68
138.0	-1230.728	2785.799	1661.007	-6623.6	-1088.9	2767.6	-81.90	-35.03	33.08
139.0	-1231.824	2785.616	1661.465	-6706.0	-1124.2	2800.9	-82.95	-35.60	33.56
140.0	-1232.935	2785.428	1661.929	-6789.5	-1160.1	2834.7	-83.96	-36.17	34.05
141.0	-1234.059	2785.235	1662.398	-6874.0	-1196.5	2868.9	-85.06	-36.74	34.53
142.0	-1235.198	2785.035	1662.873	-6959.7	-1233.6	2903.6	-86.22	-37.34	34.95
143.0	-1236.350	2784.828	1663.354	-7046.4	-1271.2	2938.8	-87.39	-37.88	35.38
144.0	-1237.517	2784.616	1663.841	-7134.4	-1309.4	2974.4	-88.62	-38.40	35.78
145.0	-1238.699	2784.397	1664.333	-7223.7	-1347.9	3010.4	-89.86	-38.84	36.28
146.0	-1239.895	2784.172	1664.831	-7314.2	-1387.0	3046.7	-91.09	-39.29	36.79
147.0	-1241.106	2783.941	1665.336	-7405.8	-1426.7	3083.9	-92.32	-39.74	37.30
148.0	-1242.333	2783.703	1665.847	-7498.8	-1466.7	3121.3	-93.53	-40.24	37.79
149.0	-1243.575	2783.458	1666.363	-7593.0	-1507.0	3159.4	-94.89	-40.39	38.48
150.0	-1244.833	2783.207	1666.887	-7688.7	-1547.4	3198.1	-96.26	-40.53	39.18
151.0	-1246.106	2782.948	1667.416	-7785.6	-1588.1	3237.6	-97.60	-40.72	39.84
152.0	-1247.402	2782.683	1667.955	-7883.9	-1628.8	3277.7	-98.97	-40.88	40.52
153.0	-1248.707	2782.411	1668.498	-7983.5	-1669.8	3318.7	-100.33	-41.03	41.20
S-IC OUTBOARD ENGINE CUTOFF									
153.820	-1249.790	2782.183	1668.948	-8066.2	-1703.5	3352.6	-101.46	-41.13	41.66
154.0	-1250.028	2782.133	1669.047	-8081.2	-1710.7	3358.3	-66.25	-38.02	23.27
S-IC/S-II SEPARATION COMMAND									
154.470	-1250.650	2782.000	1669.305	-8092.4	-1725.6	3359.1	8.83	-25.87	-13.98
156.0	-1252.681	2781.561	1670.145	-8078.8	-1765.2	3337.8	8.84	-25.85	-14.01
158.0	-1255.336	2780.972	1671.239	-8068.6	-1817.2	3313.6	-2.44	-25.89	-7.82
160.0	-1257.996	2780.364	1672.329	-8080.6	-1871.9	3301.1	-8.30	-28.03	-5.37
162.0	-1260.658	2779.739	1673.413	-8099.6	-1927.9	3291.6	-10.67	-28.19	-4.13
164.0	-1263.328	2779.095	1674.495	-8121.5	-1984.0	3283.6	-11.05	-28.08	-3.90
166.0	-1266.005	2778.433	1675.575	-8144.4	-2040.5	3276.2	-11.74	-28.12	-3.56
168.0	-1268.689	2777.752	1676.652	-8168.1	-2096.8	3269.1	-12.03	-28.14	-3.42
170.0	-1271.382	2777.052	1677.727	-8192.1	-2153.0	3262.3	-12.00	-28.12	-3.46
172.0	-1274.082	2776.335	1678.800	-8216.2	-2209.3	3255.4	-12.11	-28.12	-3.37
174.0	-1276.791	2775.598	1679.870	-8240.6	-2265.5	3248.8	-12.24	-28.11	-3.30
176.0	-1279.507	2774.843	1680.938	-8265.2	-2321.7	3242.2	-12.36	-28.11	-3.24
178.0	-1282.232	2774.070	1682.004	-8290.0	-2377.9	3235.8	-12.48	-28.10	-3.18

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
180.0	-1284.965	2773.278	1683.069	-8315.0	-2434.1	3229.5	-12.52	-28.08	-3.10
182.0	-1287.706	2772.467	1684.131	-8340.2	-2490.2	3223.4	-12.60	-28.05	-3.05
184.0	-1290.455	2771.638	1685.191	-8365.5	-2546.3	3217.3	-12.76	-28.07	-3.02
186.0	-1293.213	2770.791	1686.249	-8391.2	-2602.5	3211.3	-12.91	-28.08	-2.92
188.0	-1295.979	2769.925	1687.305	-8417.2	-2658.7	3205.6	-13.09	-28.11	-2.84
190.0	-1298.754	2769.041	1688.359	-8443.5	-2714.8	3200.1	-13.25	-28.04	-2.71
192.0	-1301.538	2768.138	1689.411	-8470.2	-2770.7	3194.8	-13.40	-27.89	-2.60
194.0	-1304.330	2767.217	1690.462	-8497.1	-2826.5	3189.6	-13.47	-27.85	-2.52
196.0	-1307.132	2766.277	1691.511	-8524.1	-2882.5	3184.6	-13.54	-28.06	-2.52
198.0	-1309.942	2765.319	1692.558	-8551.1	-2938.7	3179.5	-13.57	-28.26	-2.56
200.0	-1312.761	2764.342	1693.604	-8578.4	-2995.3	3174.4	-13.67	-28.28	-2.53
202.0	-1315.589	2763.347	1694.648	-8605.9	-3051.8	3169.5	-13.82	-28.22	-2.43
204.0	-1318.426	2762.333	1695.691	-8633.7	-3108.3	3164.7	-13.96	-28.27	-2.34
206.0	-1321.273	2761.301	1696.732	-8661.6	-3164.9	3160.0	-13.98	-28.36	-2.32
208.0	-1324.129	2760.250	1697.771	-8689.7	-3221.7	3155.4	-14.07	-28.42	-2.31
210.0	-1326.993	2759.180	1698.809	-8717.9	-3278.6	3150.8	-14.17	-28.44	-2.30
212.0	-1329.868	2758.092	1699.845	-8746.3	-3335.5	3146.2	-14.28	-28.50	-2.27
214.0	-1332.751	2756.984	1700.880	-8774.9	-3392.6	3141.7	-14.35	-28.59	-2.24
216.0	-1335.644	2755.858	1701.914	-8803.7	-3449.8	3137.3	-14.42	-28.61	-2.19
218.0	-1338.547	2754.713	1702.945	-8832.7	-3507.1	3132.9	-14.53	-28.71	-2.16
220.0	-1341.459	2753.549	1703.976	-8861.8	-3564.5	3128.7	-14.63	-28.75	-2.10
222.0	-1344.381	2752.367	1705.005	-8891.2	-3622.1	3124.5	-14.74	-28.78	-2.07
224.0	-1347.312	2751.165	1706.033	-8920.8	-3679.7	3120.4	-14.87	-28.85	-2.06
226.0	-1350.254	2749.944	1707.059	-8950.6	-3737.5	3116.3	-14.96	-28.93	-2.05
228.0	-1353.205	2748.704	1708.084	-8980.6	-3795.4	3112.2	-15.02	-29.01	-1.98
230.0	-1356.166	2747.446	1709.108	-9010.7	-3853.5	3108.3	-15.09	-29.07	-1.94
232.0	-1359.137	2746.168	1710.131	-9041.1	-3911.7	3104.4	-15.23	-29.12	-1.90
234.0	-1362.118	2744.870	1711.152	-9071.6	-3970.0	3100.7	-15.36	-29.22	-1.88
236.0	-1365.109	2743.554	1712.172	-9102.4	-4028.5	3096.9	-15.46	-29.27	-1.85
238.0	-1368.110	2742.218	1713.191	-9133.4	-4087.1	3093.3	-15.51	-29.32	-1.80
240.0	-1371.121	2740.864	1714.208	-9164.5	-4145.8	3089.7	-15.60	-29.38	-1.78
242.0	-1374.143	2739.489	1715.225	-9195.9	-4204.6	3086.2	-15.76	-29.49	-1.73
244.0	-1377.175	2738.096	1716.240	-9227.5	-4263.7	3082.8	-15.88	-29.59	-1.70
246.0	-1380.218	2736.682	1717.254	-9259.3	-4322.9	3079.4	-15.98	-29.63	-1.69
248.0	-1383.271	2735.250	1718.267	-9291.5	-4382.3	3076.0	-16.08	-29.71	-1.65
250.0	-1386.334	2733.797	1719.279	-9323.7	-4441.8	3072.8	-16.20	-29.78	-1.62
252.0	-1389.409	2732.326	1720.290	-9356.2	-4501.4	3069.6	-16.30	-29.87	-1.58
254.0	-1392.494	2730.834	1721.300	-9388.9	-4561.2	3066.5	-16.38	-29.96	-1.57
256.0	-1395.589	2729.323	1722.309	-9421.8	-4621.3	3063.4	-16.51	-30.05	-1.55
258.0	-1398.696	2727.792	1723.317	-9454.9	-4681.4	3060.3	-16.64	-30.13	-1.48
260.0	-1401.814	2726.241	1724.323	-9488.3	-4741.7	3057.4	-16.72	-30.18	-1.44
262.0	-1404.942	2724.670	1725.329	-9521.9	-4802.2	3054.6	-16.87	-30.24	-1.37
264.0	-1408.082	2723.080	1726.334	-9555.7	-4862.8	3051.9	-16.99	-30.37	-1.36

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
266.0	-1411.233	2721.469	1727.338	-9589.8	-4923.6	3049.2	-17.08	-30.47	-1.33
268.0	-1414.395	2719.838	1728.342	-9624.0	-4984.6	3046.5	-17.19	-30.56	-1.34
270.0	-1417.569	2718.187	1729.344	-9658.6	-5045.9	3043.9	-17.32	-30.66	-1.31
272.0	-1420.754	2716.516	1730.345	-9693.3	-5107.3	3041.3	-17.47	-30.78	-1.26
274.0	-1423.950	2714.825	1731.346	-9728.4	-5168.9	3038.8	-17.60	-30.87	-1.22
276.0	-1427.158	2713.114	1732.346	-9763.7	-5230.7	3036.4	-17.69	-30.95	-1.20
278.0	-1430.378	2711.382	1733.345	-9799.3	-5292.8	3034.0	-17.87	-31.07	-1.12
280.0	-1433.609	2709.629	1734.343	-9835.1	-5355.0	3031.8	-18.00	-31.17	-1.10
282.0	-1436.852	2707.856	1735.341	-9871.2	-5417.4	3029.7	-18.09	-31.23	-1.06
284.0	-1440.108	2706.063	1736.338	-9907.5	-5480.0	3027.6	-18.18	-31.34	-1.05
286.0	-1443.375	2704.249	1737.334	-9944.0	-5542.7	3025.5	-18.32	-31.43	-1.05
288.0	-1446.654	2702.414	1738.330	-9980.8	-5605.8	3023.4	-18.45	-31.61	-1.01
290.0	-1449.945	2700.558	1739.324	-10017.8	-5669.0	3021.4	-18.57	-31.69	-0.98
292.0	-1453.249	2698.682	1740.319	-10055.1	-5732.6	3019.5	-18.67	-31.83	-0.94
294.0	-1456.565	2696.785	1741.312	-10092.5	-5796.3	3017.6	-18.84	-31.92	-0.89
296.0	-1459.893	2694.866	1742.305	-10130.3	-5860.2	3015.9	-18.97	-32.00	-0.87
298.0	-1463.234	2692.927	1743.298	-10168.4	-5924.4	3014.2	-19.13	-32.10	-0.80
300.0	-1466.587	2690.966	1744.289	-10206.8	-5988.7	3012.6	-19.26	-32.25	-0.78
302.0	-1469.953	2688.984	1745.281	-10245.5	-6053.3	3011.1	-19.38	-32.37	-0.75
304.0	-1473.332	2686.981	1746.272	-10284.4	-6118.2	3009.6	-19.53	-32.50	-0.77
306.0	-1476.723	2684.956	1747.262	-10323.6	-6183.3	3008.1	-19.71	-32.64	-0.72
308.0	-1480.128	2682.910	1748.252	-10363.2	-6248.7	3006.6	-19.87	-32.74	-0.69
310.0	-1483.546	2680.843	1749.241	-10403.0	-6314.3	3005.3	-19.96	-32.88	-0.65
312.0	-1486.976	2678.754	1750.230	-10443.0	-6380.2	3004.1	-20.09	-33.01	-0.60
314.0	-1490.420	2676.643	1751.219	-10483.3	-6446.4	3002.9	-20.19	-33.16	-0.57
316.0	-1493.878	2674.510	1752.207	-10523.8	-6512.8	3001.8	-20.34	-33.30	-0.58
318.0	-1497.348	2672.355	1753.195	-10564.7	-6579.5	3000.6	-20.50	-33.42	-0.52
320.0	-1500.833	2670.178	1754.183	-10605.9	-6646.5	2999.6	-20.69	-33.52	-0.50
322.0	-1504.331	2667.980	1755.170	-10647.4	-6713.7	2998.7	-20.83	-33.70	-0.46
324.0	-1507.842	2665.759	1756.157	-10689.2	-6781.2	2997.7	-20.97	-33.84	-0.44
326.0	-1511.367	2663.515	1757.143	-10731.3	-6849.1	2996.9	-21.14	-33.99	-0.41
328.0	-1514.907	2661.250	1758.130	-10773.7	-6917.2	2996.1	-21.26	-34.12	-0.36
330.0	-1518.460	2658.962	1759.116	-10816.4	-6985.5	2995.5	-21.40	-34.25	-0.32
332.0	-1522.027	2656.651	1760.102	-10859.4	-7054.2	2994.9	-21.59	-34.43	-0.30
334.0	-1525.609	2654.318	1761.087	-10902.7	-7123.2	2994.3	-21.79	-34.59	-0.26
336.0	-1529.205	2651.962	1762.073	-10946.4	-7192.6	2993.8	-21.95	-34.75	-0.24
338.0	-1532.815	2649.583	1763.058	-10990.5	-7262.3	2993.4	-22.04	-34.92	-0.21
340.0	-1536.440	2647.181	1764.043	-11034.7	-7332.2	2993.0	-22.21	-35.08	-0.18
342.0	-1540.079	2644.756	1765.029	-11079.3	-7402.5	2992.6	-22.39	-35.23	-0.16
344.0	-1543.734	2642.308	1766.014	-11124.3	-7473.1	2992.3	-22.59	-35.39	-0.13
346.0	-1547.403	2639.836	1766.998	-11169.6	-7544.1	2992.1	-22.76	-35.53	-0.08
348.0	-1551.087	2637.341	1767.983	-11215.3	-7615.3	2992.0	-22.93	-35.72	-0.06
350.0	-1554.786	2634.823	1768.968	-11261.3	-7687.0	2991.8	-23.11	-35.92	-0.06

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
352.0	-1558.500	2632.281	1769.953	-11307.7	-7758.9	2991.8	-23.23	-36.07	-0.04
354.0	-1562.230	2629.715	1770.938	-11354.3	-7831.3	2991.7	-23.40	-36.28	-0.00
356.0	-1565.975	2627.125	1771.922	-11401.3	-7904.0	2991.7	-23.60	-36.44	0.05
358.0	-1569.736	2624.511	1772.907	-11448.7	-7977.1	2991.9	-23.81	-36.62	0.09
360.0	-1573.512	2621.874	1773.892	-11496.5	-8050.5	2992.1	-23.98	-36.79	0.10
362.0	-1577.304	2619.212	1774.877	-11544.6	-8124.2	2992.3	-24.09	-36.97	0.12
364.0	-1581.112	2616.525	1775.862	-11593.0	-8198.3	2992.6	-24.30	-37.17	0.14
366.0	-1584.936	2613.815	1776.847	-11641.8	-8272.9	2992.9	-24.54	-37.36	0.20
368.0	-1588.776	2611.079	1777.832	-11691.0	-8347.8	2993.4	-24.67	-37.54	0.26
370.0	-1592.632	2608.319	1778.818	-11740.5	-8423.1	2993.9	-24.84	-37.76	0.26
372.0	-1596.505	2605.534	1779.803	-11790.4	-8498.8	2994.4	-25.03	-37.92	0.27
374.0	-1600.394	2602.724	1780.789	-11840.6	-8574.8	2995.0	-25.22	-38.13	0.32
376.0	-1604.300	2599.889	1781.775	-11891.3	-8651.3	2995.7	-25.47	-38.35	0.35
378.0	-1608.223	2597.029	1782.761	-11942.5	-8728.2	2996.5	-25.64	-38.61	0.42
380.0	-1612.162	2594.143	1783.747	-11993.9	-8805.7	2997.4	-25.86	-38.87	0.49
382.0	-1616.118	2591.232	1784.734	-12045.9	-8883.7	2998.4	-26.05	-39.08	0.51
384.0	-1620.092	2588.295	1785.721	-12098.2	-8962.0	2999.5	-26.23	-39.23	0.54
386.0	-1624.083	2585.332	1786.709	-12150.8	-9040.7	3000.6	-26.43	-39.46	0.59
388.0	-1628.091	2582.343	1787.697	-12203.9	-9119.8	3001.8	-26.66	-39.70	0.60
390.0	-1632.117	2579.328	1788.685	-12257.4	-9199.5	3003.0	-26.86	-39.94	0.62
392.0	-1636.160	2576.287	1789.674	-12311.4	-9279.6	3004.3	-27.10	-40.18	0.66
394.0	-1640.222	2573.219	1790.663	-12365.8	-9360.2	3005.5	-27.32	-40.43	0.67
396.0	-1644.301	2570.125	1791.652	-12420.8	-9441.3	3006.9	-27.61	-40.69	0.70
398.0	-1648.399	2567.004	1792.642	-12476.2	-9523.0	3008.4	-27.87	-40.97	0.77
400.0	-1652.514	2563.856	1793.633	-12532.1	-9605.1	3009.9	-28.03	-41.17	0.78
402.0	-1656.649	2560.681	1794.624	-12588.4	-9687.7	3011.6	-28.21	-41.44	0.83
404.0	-1660.802	2557.478	1795.615	-12645.0	-9770.8	3013.2	-28.44	-41.67	0.86
406.0	-1664.973	2554.248	1796.607	-12702.1	-9854.4	3015.0	-28.72	-41.94	0.88
408.0	-1669.164	2550.991	1797.600	-12759.9	-9938.6	3016.8	-28.98	-42.22	0.93
410.0	-1673.373	2547.705	1798.593	-12818.0	-10023.3	3018.7	-29.22	-42.47	0.96
412.0	-1677.602	2544.392	1799.587	-12876.7	-10108.5	3020.6	-29.44	-42.76	0.98
414.0	-1681.850	2541.051	1800.582	-12935.8	-10194.3	3022.6	-29.66	-43.06	1.02
416.0	-1686.118	2537.681	1801.577	-12995.4	-10280.7	3024.7	-29.92	-43.33	1.04
418.0	-1690.405	2534.283	1802.573	-13055.5	-10367.7	3026.8	-30.25	-43.64	1.09
420.0	-1694.713	2530.856	1803.570	-13116.3	-10455.2	3029.1	-30.50	-43.92	1.14
422.0	-1699.040	2527.400	1804.567	-13177.5	-10543.4	3031.4	-30.77	-44.21	1.22
424.0	-1703.388	2523.915	1805.565	-13239.3	-10632.1	3033.8	-31.02	-44.49	1.22
426.0	-1707.756	2520.401	1806.564	-13301.7	-10721.4	3036.3	-31.32	-44.79	1.22
428.0	-1712.144	2516.857	1807.564	-13364.7	-10811.3	3038.8	-31.64	-45.13	1.26
430.0	-1716.554	2513.283	1808.565	-13428.3	-10901.9	3041.3	-31.95	-45.52	1.31
432.0	-1720.935	2509.680	1809.566	-13492.4	-10993.2	3044.0	-32.19	-45.83	1.37
434.0	-1725.436	2506.046	1810.569	-13556.6	-11085.0	3046.5	-32.46	-46.15	1.44
436.0	-1729.909	2502.382	1811.572	-13621.8	-11177.7	3049.6	-32.74	-46.49	1.51

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
438.0	-1734.404	2498.687	1812.576	-13687.6	-11270.9	3052.5	-33.02	-46.82	1.57
440.0	-1738.920	2494.962	1813.582	-13754.0	-11364.8	3055.5	-33.29	-47.15	1.64
442.0	-1743.459	2491.206	1814.588	-13820.9	-11459.4	3058.8	-33.57	-47.49	1.71
444.0	-1748.019	2487.418	1815.595	-13888.4	-11554.6	3062.0	-33.85	-47.82	1.77
446.0	-1752.602	2483.599	1816.604	-13955.7	-11649.9	3064.8	-30.56	-46.33	0.46
448.0	-1757.204	2479.750	1817.612	-14007.3	-11737.7	3062.1	-23.66	-42.80	-2.17
450.0	-1761.823	2475.872	1818.619	-14054.5	-11823.5	3057.6	-23.59	-43.06	-2.27
452.0	-1766.457	2471.966	1819.625	-14101.7	-11909.8	3052.7	-23.52	-43.31	-2.38
454.0	-1771.106	2468.032	1820.629	-14148.6	-11996.7	3048.0	-23.45	-43.57	-2.49
456.0	-1775.771	2464.068	1821.632	-14196.1	-12084.3	3043.2	-23.50	-43.82	-2.53
458.0	-1780.452	2460.076	1822.633	-14243.3	-12172.2	3038.2	-23.71	-44.05	-2.53
460.0	-1785.148	2456.055	1823.632	-14290.9	-12260.5	3033.1	-23.90	-44.23	-2.53
462.0	-1789.860	2452.005	1824.629	-14338.8	-12349.1	3028.0	-24.00	-44.43	-2.59
464.0	-1794.587	2447.925	1825.625	-14386.9	-12438.2	3022.8	-24.11	-44.63	-2.61
466.0	-1799.331	2443.817	1826.619	-14435.4	-12527.8	3017.6	-24.33	-44.94	-2.61
468.0	-1804.090	2439.678	1827.612	-14484.2	-12618.0	3012.3	-24.54	-45.25	-2.61
470.0	-1808.866	2435.510	1828.602	-14533.5	-12708.7	3007.1	-24.73	-45.50	-2.61
472.0	-1813.658	2431.312	1829.591	-14583.1	-12800.0	3001.9	-24.88	-45.76	-2.63
474.0	-1818.466	2427.083	1830.579	-14633.0	-12891.7	2996.7	-25.00	-45.96	-2.60
476.0	-1823.291	2422.825	1831.564	-14683.2	-12983.9	2991.5	-25.18	-46.22	-2.62
478.0	-1828.133	2418.536	1832.548	-14733.8	-13076.6	2986.2	-25.42	-46.48	-2.67
480.0	-1832.991	2414.216	1833.530	-14784.9	-13169.8	2980.8	-25.68	-46.74	-2.69
482.0	-1837.866	2409.866	1834.510	-14836.3	-13263.5	2975.4	-25.80	-46.95	-2.74
484.0	-1842.758	2405.485	1835.489	-14888.0	-13357.7	2969.9	-25.84	-47.23	-2.75
486.0	-1847.667	2401.072	1836.465	-14939.8	-13452.4	2964.4	-25.95	-47.47	-2.78
488.0	-1852.593	2396.629	1837.440	-14991.9	-13547.7	2958.8	-26.13	-47.82	-2.77
490.0	-1857.536	2392.154	1838.413	-15044.3	-13643.7	2953.3	-26.31	-48.15	-2.78
492.0	-1862.497	2387.647	1839.384	-15097.1	-13740.2	2947.7	-26.47	-48.41	-2.79
494.0	-1867.475	2383.108	1840.354	-15150.3	-13837.4	2942.1	-26.73	-48.81	-2.81
496.0	-1872.471	2378.537	1841.321	-15204.1	-13935.6	2936.5	-27.10	-49.28	-2.79
498.0	-1877.484	2373.934	1842.287	-15258.7	-14034.6	2930.9	-27.42	-49.75	-2.79
500.0	-1882.516	2369.298	1843.251	-15313.6	-14134.2	2925.3	-27.55	-49.94	-2.88
502.0	-1887.565	2364.629	1844.212	-15368.7	-14234.1	2919.5	-27.53	-49.91	-2.90
504.0	-1892.633	2359.927	1845.173	-15423.8	-14334.1	2913.7	-27.60	-50.06	-2.89
506.0	-1897.719	2355.193	1846.131	-15479.3	-14434.7	2908.0	-27.89	-50.53	-2.81
508.0	-1902.823	2350.425	1847.087	-15535.4	-14536.3	2902.4	-28.23	-51.12	-2.78
510.0	-1907.946	2345.623	1848.041	-15592.2	-14638.9	2896.8	-28.51	-51.55	-2.83
512.0	-1913.088	2340.788	1848.994	-15649.5	-14742.3	2891.1	-28.78	-51.79	-2.83
514.0	-1918.249	2335.918	1849.945	-15707.0	-14846.0	2885.3	-29.05	-52.10	-2.83
516.0	-1923.428	2331.014	1850.893	-15765.5	-14950.6	2879.7	-29.36	-52.44	-2.77
518.0	-1928.627	2326.075	1851.840	-15824.5	-15055.7	2874.4	-29.71	-52.70	-2.67
520.0	-1933.846	2321.102	1852.786	-15884.2	-15161.4	2869.2	-30.05	-52.95	-2.56
522.0	-1939.087	2316.092	1853.730	-15944.7	-15267.5	2864.0	-30.40	-53.21	-2.46

TABLE C-II. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
524.0	-1944.345	2311.049	1854.672	-16005.7	-15374.2	2859.5	-30.36	-53.70	-1.66
S-II ENGINE CUTOFF									
524.040	-1944.451	2310.948	1854.691	-16006.8	-15376.3	2859.4	-30.35	-53.72	-1.63
S-II/S-IVB SEPARATION COMMAND									
524.900	-1946.715	2308.771	1855.094	-16002.7	-15400.7	2848.7	16.30	-20.01	-16.12
526.0	-1949.607	2305.983	1855.607	-15984.8	-15422.7	2830.9	16.29	-20.00	-16.13
528.0	-1954.863	2300.900	1856.534	-15952.2	-15463.0	2799.1	15.30	-20.67	-15.82
530.0	-1960.110	2295.802	1857.450	-15927.1	-15508.3	2769.6	6.38	-26.69	-12.87
532.0	-1965.351	2290.688	1858.358	-15919.1	-15564.9	2745.2	3.19	-28.99	-11.88
534.0	-1970.590	2285.555	1859.258	-15913.5	-15623.5	2721.5	2.57	-29.64	-11.76
536.0	-1975.828	2280.402	1860.149	-15908.4	-15683.8	2697.7	2.52	-30.19	-11.94
538.0	-1981.063	2275.230	1861.033	-15902.9	-15744.7	2673.5	2.84	-30.68	-12.30
540.0	-1986.297	2270.037	1861.909	-15897.1	-15806.7	2648.6	3.01	-31.36	-12.60
542.0	-1991.528	2264.824	1862.777	-15890.9	-15869.9	2623.1	3.23	-31.81	-12.91
544.0	-1996.758	2259.590	1863.636	-15884.2	-15933.8	2597.0	3.41	-32.07	-13.13
546.0	-2001.985	2254.335	1864.487	-15877.3	-15998.0	2570.7	3.51	-32.10	-13.22
548.0	-2007.210	2249.058	1865.328	-15870.3	-16062.1	2544.3	3.49	-32.04	-13.14
550.0	-2012.433	2243.761	1866.162	-15863.3	-16126.2	2518.1	3.44	-32.00	-13.04
552.0	-2017.653	2238.442	1866.986	-15856.4	-16190.1	2492.0	3.48	-31.98	-13.07
554.0	-2022.871	2233.102	1867.802	-15849.4	-16254.1	2465.7	3.61	-31.99	-13.21
556.0	-2028.087	2227.742	1868.609	-15842.1	-16318.2	2439.2	3.67	-32.03	-13.32
558.0	-2033.300	2222.360	1869.408	-15834.7	-16382.2	2412.5	3.73	-31.99	-13.34
560.0	-2038.511	2216.957	1870.198	-15827.2	-16446.2	2385.9	3.76	-31.98	-13.32
562.0	-2043.720	2211.533	1870.979	-15819.6	-16510.1	2359.2	3.80	-31.99	-13.36
564.0	-2048.926	2206.088	1871.751	-15812.0	-16574.1	2332.4	3.83	-31.98	-13.35
566.0	-2054.129	2200.622	1872.514	-15804.4	-16638.1	2305.7	3.80	-32.00	-13.41
568.0	-2059.330	2195.135	1873.269	-15796.8	-16702.0	2278.9	3.77	-31.98	-13.38
570.0	-2064.528	2189.627	1874.014	-15789.2	-16766.0	2252.2	3.77	-31.94	-13.36
572.0	-2069.724	2184.098	1874.751	-15781.7	-16829.9	2225.4	3.79	-31.98	-13.40
574.0	-2074.918	2178.548	1875.479	-15774.1	-16893.8	2198.6	3.82	-31.99	-13.43
576.0	-2080.109	2172.976	1876.199	-15766.4	-16957.8	2171.8	3.81	-31.98	-13.41
578.0	-2085.297	2167.384	1876.909	-15758.8	-17021.8	2144.9	3.83	-31.98	-13.42
580.0	-2090.483	2161.771	1877.611	-15751.1	-17085.8	2118.0	3.85	-32.00	-13.45
582.0	-2095.666	2156.136	1878.303	-15743.4	-17149.8	2091.2	3.91	-32.03	-13.47
584.0	-2100.847	2150.481	1878.987	-15735.5	-17213.9	2064.2	3.95	-32.03	-13.48
586.0	-2106.025	2144.804	1879.662	-15727.6	-17277.9	2037.2	3.97	-31.99	-13.49
588.0	-2111.201	2139.106	1880.328	-15719.7	-17341.8	2010.2	3.93	-31.94	-13.48
590.0	-2116.374	2133.388	1880.986	-15711.9	-17405.7	1983.3	3.89	-31.95	-13.47
592.0	-2121.544	2127.648	1881.634	-15704.1	-17469.7	1956.4	3.87	-32.04	-13.45

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
594.0	-2126.712	2121.887	1882.274	-15696.4	-17533.8	1929.5	3.86	-32.10	-13.46
596.0	-2131.877	2116.105	1882.904	-15688.6	-17598.0	1902.6	3.87	-32.11	-13.46
598.0	-2137.040	2110.302	1883.526	-15680.9	-17662.2	1875.7	3.90	-32.09	-13.47
600.0	-2142.200	2104.478	1884.139	-15673.1	-17726.4	1848.6	3.93	-32.11	-13.51
602.0	-2147.358	2098.633	1884.743	-15665.2	-17790.7	1821.6	3.97	-32.17	-13.55
604.0	-2152.513	2092.766	1885.338	-15657.2	-17855.0	1794.5	3.99	-32.15	-13.54
606.0	-2157.665	2086.878	1885.924	-15649.2	-17919.3	1767.4	3.99	-32.10	-13.52
608.0	-2162.815	2080.969	1886.502	-15641.2	-17983.5	1740.4	4.02	-32.07	-13.51
610.0	-2167.962	2075.040	1887.070	-15633.1	-18047.6	1713.4	4.08	-32.04	-13.48
612.0	-2173.106	2069.088	1887.630	-15624.9	-18111.6	1686.4	4.09	-31.97	-13.52
614.0	-2178.248	2063.116	1888.180	-15616.8	-18175.5	1659.4	4.06	-31.93	-13.49
616.0	-2183.387	2057.123	1888.722	-15608.6	-18239.4	1632.5	4.07	-31.95	-13.46
618.0	-2188.523	2051.109	1889.255	-15600.5	-18303.2	1605.6	4.06	-31.95	-13.46
620.0	-2193.657	2045.074	1889.779	-15592.4	-18367.0	1578.7	4.06	-31.87	-13.42
622.0	-2198.788	2039.018	1890.294	-15584.3	-18430.8	1551.9	4.03	-31.82	-13.43
624.0	-2203.916	2032.941	1890.801	-15576.2	-18494.5	1525.0	4.03	-31.88	-13.45
626.0	-2209.042	2026.843	1891.298	-15568.1	-18558.3	1498.1	4.06	-31.92	-13.44
628.0	-2214.165	2020.724	1891.787	-15560.0	-18622.1	1471.2	4.10	-31.86	-13.43
630.0	-2219.286	2014.583	1892.267	-15551.9	-18685.8	1444.4	4.05	-31.82	-13.41
632.0	-2224.403	2008.422	1892.738	-15543.7	-18749.5	1417.6	4.04	-31.87	-13.43
634.0	-2229.518	2002.240	1893.200	-15535.7	-18813.3	1390.7	4.01	-31.98	-13.43
636.0	-2234.631	1996.037	1893.653	-15527.7	-18877.2	1363.8	3.97	-32.00	-13.43
638.0	-2239.740	1989.813	1894.098	-15519.8	-18941.3	1337.0	3.99	-32.02	-13.40
640.0	-2244.848	1983.568	1894.533	-15511.9	-19005.4	1310.1	3.95	-32.08	-13.45
642.0	-2249.952	1977.302	1894.960	-15503.9	-19069.6	1283.3	3.98	-32.09	-13.41
644.0	-2255.054	1971.014	1895.378	-15495.9	-19133.7	1256.4	4.05	-32.05	-13.45
646.0	-2260.153	1964.706	1895.787	-15487.7	-19197.7	1229.5	4.10	-31.97	-13.48
648.0	-2265.250	1958.376	1896.188	-15479.5	-19261.7	1202.6	4.15	-31.95	-13.44
650.0	-2270.344	1952.025	1896.579	-15471.2	-19325.6	1175.7	4.12	-31.96	-13.45
652.0	-2275.435	1945.654	1896.962	-15463.0	-19389.5	1148.8	4.09	-31.95	-13.41
654.0	-2280.523	1939.261	1897.335	-15455.0	-19453.3	1122.1	3.94	-31.85	-13.31
656.0	-2285.609	1932.847	1897.700	-15447.3	-19516.9	1095.6	3.75	-31.74	-13.20
658.0	-2290.692	1926.413	1898.057	-15439.9	-19580.3	1069.3	3.64	-31.64	-13.08
660.0	-2295.773	1919.957	1898.404	-15432.6	-19643.5	1043.1	3.63	-31.65	-13.11
662.0	-2300.852	1913.481	1898.743	-15425.3	-19706.9	1016.9	3.70	-31.67	-13.14
664.0	-2305.928	1906.984	1899.074	-15417.9	-19770.2	990.6	3.73	-31.69	-13.13
666.0	-2311.002	1900.466	1899.395	-15410.4	-19833.5	964.3	3.72	-31.67	-13.13
668.0	-2316.073	1893.927	1899.708	-15403.0	-19896.9	938.1	3.67	-31.68	-13.10
670.0	-2321.142	1887.368	1900.013	-15395.7	-19960.3	911.9	3.63	-31.71	-13.08
672.0	-2326.208	1880.787	1900.309	-15388.5	-20023.7	885.8	3.62	-31.74	-13.08
674.0	-2331.272	1874.186	1900.596	-15381.2	-20087.2	859.6	3.66	-31.73	-13.09
676.0	-2336.334	1867.563	1900.875	-15373.8	-20150.6	833.4	3.70	-31.71	-13.10
678.0	-2341.393	1860.920	1901.145	-15366.4	-20214.0	807.2	3.71	-31.71	-13.10

TABLE C-11. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - ASCENT PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
680.0	-2346.450	1854.256	1901.406	-15359.0	-20277.4	780.9	3.73	-31.70	-13.10
682.0	-2351.504	1847.571	1901.659	-15351.5	-20340.8	754.7	3.74	-31.71	-13.10
684.0	-2356.556	1840.866	1901.903	-15344.1	-20404.2	728.3	3.76	-31.70	-13.11
S-IVB FIRST GUIDANCE CUTOFF									
684.980	-2359.030	1837.572	1902.019	-15340.4	-20435.3	715.5	3.82	-31.74	-13.02
686.0	-2361.604	1834.140	1902.138	-15323.9	-20455.5	699.7	20.26	-15.57	-16.61
688.0	-2366.640	1827.403	1902.362	-15283.2	-20486.6	666.7	20.40	-15.60	-16.36
690.0	-2371.664	1820.655	1902.577	-15242.3	-20517.8	634.0	20.41	-15.56	-16.35
692.0	-2376.675	1813.896	1902.780	-15201.6	-20548.8	601.2	20.42	-15.51	-16.34
694.0	-2381.672	1807.128	1902.972	-15160.7	-20579.8	568.5	20.43	-15.47	-16.33
PARKING ORBIT INSERTION									
694.980	-2384.114	1803.806	1903.062	-15140.7	-20594.3	552.7	20.41	-15.44	-16.34

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SFC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
GUIDANCE REFERENCE RELEASE											
-16.970	3441.335	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-16.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-15.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-14.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-13.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-12.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-11.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-10.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-9.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-8.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-7.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-6.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-5.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-4.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-3.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-2.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-1.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
-0.0	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
FIRST MOTION											
0.330	3441.336	-80.6041	28.4470	0.0	90.00	0.0	90.00	0.0	1340.7	0.0	195
IU UMBILICAL DISCONNECT											
0.670	3441.336	-80.6041	28.4470	359.49	89.26	2.2	90.00	0.09	1340.7	0.000	196
1.0	3441.337	-80.6041	28.4470	359.95	89.14	4.8	90.00	0.20	1340.7	0.000	197
2.0	3441.338	-80.6041	28.4470	4.79	88.77	13.1	89.99	0.56	1340.8	0.000	206
3.0	3441.341	-80.6041	28.4470	13.90	88.69	21.6	89.98	0.92	1341.0	0.000	223
4.0	3441.345	-80.6041	28.4470	44.29	89.05	30.4	89.98	1.30	1341.4	0.000	249
5.0	3441.351	-80.6041	28.4470	103.97	89.03	39.4	90.01	1.68	1341.9	0.000	284
6.0	3441.358	-80.6041	28.4470	130.99	88.50	48.7	90.04	2.08	1342.5	0.000	328
7.0	3441.367	-80.6041	28.4470	142.81	87.96	58.2	90.07	2.48	1343.2	0.000	381
8.0	3441.377	-80.6041	28.4470	148.70	87.50	67.8	90.11	2.89	1343.9	0.001	444
9.0	3441.389	-80.6041	28.4469	152.41	87.14	77.7	90.15	3.31	1344.7	0.001	517
10.0	3441.403	-80.6041	28.4469	155.04	86.87	87.8	90.19	3.73	1345.6	0.002	599
11.0	3441.418	-80.6041	28.4469	157.02	86.71	98.1	90.22	4.17	1346.5	0.003	692
12.0	3441.435	-80.6041	28.4469	158.07	86.71	108.6	90.25	4.62	1347.4	0.004	795
13.0	3441.454	-80.6041	28.4469	157.67	86.86	119.3	90.26	5.07	1348.5	0.005	909
14.0	3441.474	-80.6041	28.4469	155.07	87.09	130.2	90.26	5.53	1349.8	0.006	1033

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
15.0	3441.497	-80.6041	28.4469	149.63	87.29	141.2	90.25	5.99	1351.5	0.007	1169
16.0	3441.521	-80.6041	28.4468	141.93	87.39	152.5	90.23	6.46	1353.6	0.008	1316
17.0	3441.547	-80.6040	28.4468	133.16	87.38	164.1	90.22	6.94	1356.2	0.009	1474
18.0	3441.575	-80.6040	28.4468	124.37	87.27	175.9	90.20	7.43	1359.1	0.010	1644
19.0	3441.605	-80.6040	28.4468	116.07	87.08	188.1	90.18	7.93	1362.4	0.012	1825
20.0	3441.637	-80.6040	28.4468	108.45	86.82	200.7	90.15	8.43	1366.1	0.014	2019
21.0	3441.671	-80.6039	28.4467	101.66	86.48	213.5	90.11	8.95	1370.3	0.016	2226
22.0	3441.705	-80.6039	28.4467	96.07	86.06	226.7	90.07	9.47	1375.0	0.019	2432
23.0	3441.741	-80.6038	28.4467	91.55	85.59	240.0	90.02	9.98	1380.2	0.022	2656
24.0	3441.782	-80.6037	28.4467	87.99	85.06	253.7	89.97	10.51	1386.0	0.025	2902
25.0	3441.825	-80.6037	28.4467	85.17	84.47	267.8	89.91	11.04	1392.3	0.028	3162
26.0	3441.870	-80.6036	28.4467	82.95	83.85	282.1	89.85	11.56	1399.3	0.032	3435
27.0	3441.917	-80.6035	28.4467	81.12	83.20	296.8	89.77	12.09	1406.8	0.037	3723
28.0	3441.967	-80.6034	28.4468	79.57	82.54	311.8	89.70	12.62	1414.9	0.042	4025
29.0	3442.019	-80.6032	28.4468	78.37	81.87	327.2	89.61	13.15	1423.6	0.049	4341
30.0	3442.073	-80.6031	28.4468	77.38	81.18	342.9	89.53	13.68	1432.9	0.056	4673
31.0	3442.130	-80.6029	28.4468	76.59	80.50	359.0	89.44	14.21	1442.8	0.065	5019
32.0	3442.190	-80.6027	28.4469	75.93	79.82	375.5	89.34	14.73	1453.2	0.075	5381
33.0	3442.252	-80.6025	28.4469	75.38	79.16	392.4	89.24	15.26	1464.2	0.086	5758
34.0	3442.317	-80.6023	28.4470	74.94	78.49	409.6	89.14	15.78	1475.8	0.099	6152
35.0	3442.384	-80.6020	28.4470	74.57	77.83	427.3	89.04	16.30	1487.9	0.112	6561
36.0	3442.454	-80.6017	28.4471	74.28	77.18	445.3	88.93	16.82	1500.7	0.128	6987
37.0	3442.527	-80.6014	28.4472	74.02	76.52	463.8	88.82	17.33	1514.2	0.144	7430
38.0	3442.603	-80.6011	28.4473	73.80	75.85	482.8	88.70	17.84	1528.3	0.163	7890
39.0	3442.681	-80.6007	28.4473	73.60	75.17	502.2	88.58	18.33	1543.3	0.183	8367
40.0	3442.762	-80.6003	28.4474	73.43	74.48	522.0	88.45	18.82	1559.0	0.205	8861
41.0	3442.847	-80.5999	28.4476	73.30	73.80	542.4	88.32	19.31	1575.5	0.228	9373
42.0	3442.934	-80.5994	28.4477	73.18	73.10	563.3	88.19	19.78	1592.7	0.254	9903
43.0	3443.024	-80.5989	28.4478	73.08	72.41	584.6	88.05	20.24	1610.7	0.282	10451
44.0	3443.117	-80.5983	28.4480	73.01	71.72	606.4	87.91	20.69	1629.4	0.312	11018
45.0	3443.214	-80.5978	28.4481	72.96	71.03	628.8	87.77	21.14	1648.9	0.344	11603
46.0	3443.313	-80.5971	28.4483	72.93	70.35	651.7	87.62	21.57	1669.2	0.379	12208
47.0	3443.416	-80.5965	28.4484	72.92	69.68	675.1	87.48	22.00	1690.1	0.416	12831
48.0	3443.521	-80.5957	28.4486	72.94	69.01	699.1	87.34	22.41	1711.9	0.456	13474
49.0	3443.631	-80.5950	28.4488	72.97	68.34	723.6	87.19	22.81	1734.5	0.499	14137
50.0	3443.743	-80.5941	28.4491	73.01	67.67	748.7	87.05	23.20	1757.9	0.544	14820
51.0	3443.859	-80.5933	28.4493	73.05	67.01	774.4	86.91	23.58	1782.1	0.592	15523
52.0	3443.978	-80.5923	28.4495	73.08	66.36	800.6	86.76	23.95	1807.0	0.643	16246
53.0	3444.100	-80.5914	28.4498	73.09	65.71	827.4	86.60	24.30	1832.7	0.698	16990
54.0	3444.226	-80.5903	28.4501	73.10	65.06	854.7	86.44	24.64	1859.1	0.755	17755
55.0	3444.355	-80.5892	28.4503	73.09	64.42	882.6	86.28	24.96	1886.3	0.816	18541
56.0	3444.488	-80.5880	28.4507	73.08	63.79	911.1	86.12	25.28	1914.1	0.880	19348
57.0	3444.624	-80.5868	28.4510	73.05	63.16	940.2	85.95	25.58	1942.8	0.948	20176

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
58.0	3444.764	-80.5855	28.4513	73.04	62.55	969.9	85.78	25.88	1972.1	1.020	21027
59.0	3444.907	-80.5841	28.4517	73.02	61.95	1000.1	85.62	26.16	2002.1	1.095	21899
60.0	3445.054	-80.5827	28.4521	73.01	61.35	1030.8	85.45	26.43	2032.8	1.175	22793
61.0	3445.205	-80.5812	28.4525	72.99	60.77	1062.1	85.28	26.68	2064.1	1.258	23709
MACH 1											
61.450	3445.274	-80.5805	28.4526	72.99	60.51	1076.3	85.21	26.79	2078.4	1.297	24128
62.0	3445.360	-80.5796	28.4529	72.97	60.20	1093.9	85.11	26.93	2096.0	1.345	24647
63.0	3445.518	-80.5780	28.4533	72.95	59.63	1126.2	84.94	27.16	2128.6	1.437	25608
64.0	3445.679	-80.5762	28.4538	72.93	59.07	1158.9	84.77	27.38	2161.9	1.532	26591
65.0	3445.845	-80.5744	28.4543	72.90	58.52	1192.4	84.60	27.59	2195.8	1.632	27597
66.0	3446.014	-80.5725	28.4548	72.87	57.97	1226.4	84.43	27.78	2230.5	1.737	28626
67.0	3446.187	-80.5705	28.4553	72.85	57.43	1261.1	84.26	27.97	2265.9	1.846	29678
68.0	3446.364	-80.5685	28.4558	72.83	56.89	1296.6	84.09	28.15	2302.2	1.960	30753
69.0	3446.545	-80.5663	28.4564	72.83	56.37	1332.8	83.93	28.32	2339.3	2.079	31851
70.0	3446.729	-80.5641	28.4570	72.83	55.86	1369.8	83.77	28.48	2377.3	2.203	32974
71.0	3446.918	-80.5618	28.4576	72.84	55.36	1407.6	83.61	28.64	2416.1	2.332	34120
72.0	3447.110	-80.5593	28.4583	72.85	54.87	1446.3	83.45	28.79	2455.7	2.466	35291
73.0	3447.307	-80.5568	28.4590	72.87	54.38	1485.6	83.30	28.93	2496.2	2.605	36487
74.0	3447.508	-80.5542	28.4597	72.89	53.90	1525.9	83.15	29.07	2537.6	2.750	37708
75.0	3447.713	-80.5515	28.4604	72.91	53.42	1566.9	83.00	29.19	2579.9	2.901	38954
76.0	3447.922	-80.5486	28.4611	72.93	52.95	1608.8	82.85	29.31	2623.2	3.057	40226
77.0	3448.136	-80.5457	28.4619	72.95	52.47	1651.6	82.71	29.41	2667.5	3.219	41524
78.0	3448.353	-80.5427	28.4627	72.97	51.99	1695.3	82.56	29.50	2712.9	3.388	42848
MAXIMUM DYNAMIC PRESSURE											
78.900	3448.553	-80.5398	28.4635	72.99	51.54	1735.4	82.43	29.56	2754.7	3.545	44062
79.0	3448.575	-80.5395	28.4636	72.99	51.50	1739.9	82.41	29.57	2759.4	3.562	44197
80.0	3448.801	-80.5362	28.4645	73.00	50.99	1785.4	82.26	29.62	2807.1	3.743	45573
81.0	3449.032	-80.5328	28.4654	73.00	50.48	1831.9	82.11	29.66	2855.9	3.931	46974
82.0	3449.267	-80.5293	28.4663	73.01	49.96	1879.3	81.95	29.68	2905.9	4.126	48401
83.0	3449.505	-80.5256	28.4673	73.00	49.42	1927.7	81.80	29.68	2957.0	4.328	49853
84.0	3449.749	-80.5218	28.4683	73.00	48.88	1977.2	81.64	29.66	3009.4	4.538	51331
85.0	3449.996	-80.5179	28.4693	72.99	48.32	2027.7	81.48	29.63	3063.0	4.756	52834
86.0	3450.247	-80.5138	28.4704	72.98	47.77	2079.2	81.32	29.59	3117.8	4.981	54362
87.0	3450.502	-80.5096	28.4715	72.98	47.21	2131.7	81.17	29.53	3173.7	5.214	55915
88.0	3450.762	-80.5052	28.4727	72.96	46.65	2185.3	81.01	29.46	3230.8	5.456	57493
89.0	3451.025	-80.5006	28.4739	72.95	46.09	2240.0	80.85	29.39	3288.9	5.707	59096
90.0	3451.293	-80.4959	28.4752	72.93	45.54	2295.8	80.70	29.30	3348.1	5.966	60723
91.0	3451.565	-80.4911	28.4765	72.91	44.99	2352.7	80.54	29.21	3408.5	6.235	62376
92.0	3451.841	-80.4861	28.4778	72.88	44.46	2410.6	80.38	29.11	3469.8	6.512	64053

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
93.0	3452.121	-80.4809	28.4792	72.86	43.93	2469.5	80.23	29.01	3532.1	6.799	65755
94.0	3452.405	-80.4755	28.4807	72.83	43.41	2529.5	80.07	28.91	3595.5	7.096	67482
95.0	3452.693	-80.4700	28.4821	72.80	42.90	2590.7	79.92	28.80	3659.9	7.402	69235
96.0	3452.985	-80.4642	28.4837	72.77	42.39	2652.8	79.77	28.69	3725.4	7.719	71012
97.0	3453.281	-80.4583	28.4853	72.74	41.90	2716.1	79.62	28.58	3791.9	8.045	72815
98.0	3453.582	-80.4522	28.4869	72.72	41.42	2780.4	79.48	28.46	3859.4	8.382	74643
99.0	3453.887	-80.4460	28.4886	72.70	40.94	2845.9	79.34	28.34	3928.0	8.729	76497
100.0	3454.196	-80.4395	28.4904	72.68	40.47	2912.5	79.20	28.22	3997.8	9.087	78377
101.0	3454.509	-80.4328	28.4922	72.66	40.01	2980.2	79.07	28.10	4068.5	9.456	80282
102.0	3454.827	-80.4259	28.4941	72.64	39.56	3049.0	78.94	27.97	4140.4	9.835	82213
103.0	3455.148	-80.4189	28.4960	72.63	39.12	3119.0	78.82	27.84	4213.4	10.226	84169
104.0	3455.474	-80.4116	28.4980	72.62	38.68	3190.2	78.70	27.71	4287.6	10.629	86152
105.0	3455.805	-80.4041	28.5000	72.60	38.25	3262.5	78.58	27.58	4362.8	11.043	88161
106.0	3456.139	-80.3964	28.5022	72.59	37.82	3335.9	78.46	27.44	4439.2	11.469	90196
107.0	3456.478	-80.3885	28.5043	72.58	37.40	3410.5	78.34	27.30	4516.7	11.907	92257
108.0	3456.821	-80.3804	28.5065	72.56	36.98	3486.4	78.22	27.16	4595.5	12.357	94344
109.0	3457.168	-80.3720	28.5088	72.55	36.57	3563.4	78.11	27.01	4675.4	12.819	96456
110.0	3457.520	-80.3634	28.5112	72.53	36.16	3641.6	77.99	26.85	4756.5	13.294	98595
111.0	3457.876	-80.3546	28.5136	72.51	35.75	3721.0	77.88	26.70	4838.8	13.782	100758
112.0	3458.235	-80.3455	28.5161	72.50	35.35	3801.8	77.77	26.54	4922.4	14.284	102948
113.0	3458.600	-80.3362	28.5187	72.49	34.95	3883.8	77.67	26.38	5007.2	14.798	105163
114.0	3458.968	-80.3267	28.5213	72.47	34.56	3967.0	77.57	26.22	5093.2	15.326	107403
115.0	3459.340	-80.3169	28.5240	72.46	34.19	4051.6	77.47	26.07	5180.4	15.868	109670
116.0	3459.717	-80.3069	28.5268	72.46	33.82	4137.5	77.37	25.91	5268.9	16.424	111962
117.0	3460.098	-80.2966	28.5296	72.45	33.46	4224.7	77.28	25.76	5358.7	16.993	114281
118.0	3460.484	-80.2860	28.5325	72.45	33.11	4313.2	77.19	25.61	5449.6	17.578	116627
119.0	3460.874	-80.2752	28.5355	72.45	32.77	4403.0	77.10	25.47	5541.8	18.176	119000
120.0	3461.268	-80.2641	28.5386	72.45	32.43	4494.2	77.02	25.32	5635.4	18.789	121398
121.0	3461.667	-80.2528	28.5417	72.45	32.11	4587.0	76.94	25.18	5730.4	19.418	123826
122.0	3462.071	-80.2411	28.5449	72.45	31.80	4681.2	76.86	25.04	5826.8	20.061	126284
123.0	3462.480	-80.2292	28.5482	72.45	31.49	4776.8	76.79	24.91	5924.6	20.720	128770
124.0	3462.893	-80.2171	28.5516	72.45	31.19	4873.8	76.71	24.77	6023.7	21.394	131283
125.0	3463.311	-80.2046	28.5550	72.45	30.90	4972.3	76.64	24.64	6124.2	22.084	133827
	S-IC INBOARD ENGINE CUTOFF										
125.880	3463.683	-80.1934	28.5581	72.45	30.65	5060.1	76.57	24.53	6213.8	22.704	136090
126.0	3463.734	-80.1918	28.5586	72.45	30.61	5072.2	76.56	24.51	6226.1	22.790	136399
127.0	3464.160	-80.1788	28.5622	72.45	30.33	5158.6	76.50	24.36	6314.6	23.510	138995
128.0	3464.591	-80.1655	28.5658	72.45	30.04	5236.8	76.44	24.20	6395.0	24.245	141614
129.0	3465.024	-80.1520	28.5696	72.45	29.76	5316.1	76.39	24.05	6476.4	24.993	144249
130.0	3465.459	-80.1382	28.5734	72.45	29.49	5396.6	76.34	23.89	6559.0	25.754	146899
131.0	3465.898	-80.1242	28.5772	72.45	29.21	5478.2	76.29	23.73	6642.7	26.528	149567

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
132.0	3466.339	-80.1100	28.5812	72.46	28.94	5560.9	76.24	23.58	6727.4	27.317	152254
133.0	3466.783	-80.0955	28.5852	72.46	28.68	5644.8	76.19	23.43	6813.3	28.119	154958
134.0	3467.231	-80.0807	28.5892	72.45	28.42	5729.9	76.13	23.28	6900.3	28.935	157680
135.0	3467.681	-80.0657	28.5934	72.47	28.16	5816.1	76.09	23.13	6988.5	29.765	160421
136.0	3468.134	-80.0504	28.5976	72.47	27.91	5903.9	76.05	22.98	7078.1	30.610	163179
137.0	3468.591	-80.0349	28.6019	72.48	27.66	5992.5	76.00	22.83	7168.7	31.469	165956
138.0	3469.050	-80.0191	28.6062	72.49	27.41	6082.7	75.96	22.69	7260.7	32.343	168751
139.0	3469.512	-80.0030	28.6107	72.49	27.17	6174.2	75.92	22.55	7353.9	33.232	171566
140.0	3469.978	-79.9867	28.6152	72.50	26.94	6266.9	75.88	22.40	7448.4	34.137	174400
141.0	3470.447	-79.9700	28.6198	72.50	26.70	6361.0	75.84	22.26	7544.2	35.056	177253
142.0	3470.919	-79.9531	28.6244	72.51	26.47	6456.4	75.79	22.13	7641.3	35.991	180126
143.0	3471.394	-79.9359	28.6292	72.51	26.25	6553.2	75.75	21.99	7739.8	36.942	183019
144.0	3471.873	-79.9184	28.6340	72.52	26.02	6651.6	75.71	21.85	7839.7	37.909	185933
145.0	3472.355	-79.9006	28.6389	72.53	25.81	6751.4	75.68	21.72	7941.1	38.892	188866
146.0	3472.840	-79.8825	28.6438	72.54	25.59	6852.6	75.64	21.59	8043.9	39.892	191820
147.0	3473.329	-79.8641	28.6489	72.54	25.38	6955.3	75.60	21.46	8148.1	40.909	194796
148.0	3473.822	-79.8454	28.6540	72.55	25.18	7059.5	75.57	21.34	8253.8	41.942	197795
149.0	3474.318	-79.8264	28.6593	72.56	24.98	7165.3	75.54	21.22	8361.0	42.992	200815
150.0	3474.818	-79.8071	28.6646	72.57	24.79	7272.7	75.51	21.10	8469.8	44.060	203858
151.0	3475.321	-79.7875	28.6699	72.58	24.60	7381.8	75.47	20.99	8580.2	45.145	206923
152.0	3475.832	-79.7674	28.6754	72.59	24.43	7492.4	75.44	20.88	8692.1	46.254	210032
153.0	3476.344	-79.7471	28.6810	72.60	24.26	7604.7	75.41	20.78	8805.6	47.375	213148
	S-IC OUTBOARD ENGINE CUTOFF										
153.820	3476.766	-79.7302	28.6856	72.61	24.12	7698.0	75.39	20.70	8899.8	48.306	215719
154.0	3476.859	-79.7265	28.6866	72.61	24.09	7714.8	75.38	20.68	8916.9	48.512	216285
	S-IC/S-II SEPARATION COMMAND										
154.470	3477.100	-79.7168	28.6893	72.61	24.00	7727.3	75.38	20.60	8930.2	49.048	217754
156.0	3477.884	-79.6850	28.6980	72.63	23.71	7712.2	75.40	20.35	8917.6	50.802	222526
158.0	3478.895	-79.6433	28.7093	72.66	23.34	7701.0	75.42	20.02	8909.7	53.101	228680
160.0	3479.894	-79.6015	28.7208	72.69	22.98	7715.6	75.43	19.72	8927.4	55.410	234762
162.0	3480.879	-79.5595	28.7322	72.72	22.62	7738.1	75.44	19.42	8952.9	57.728	240757
164.0	3481.853	-79.5172	28.7437	72.75	22.27	7764.3	75.46	19.12	8982.1	60.058	246688
166.0	3482.816	-79.4747	28.7552	72.77	21.92	7792.1	75.47	18.83	9012.7	62.403	252551
168.0	3483.768	-79.4319	28.7668	72.80	21.58	7821.0	75.48	18.54	9044.4	64.761	258348
170.0	3484.709	-79.3889	28.7784	72.83	21.24	7850.8	75.49	18.26	9076.8	67.132	264080
172.0	3485.640	-79.3456	28.7900	72.86	20.90	7880.9	75.50	17.98	9109.6	69.518	269747
174.0	3486.560	-79.3020	28.8018	72.89	20.57	7911.7	75.51	17.70	9143.0	71.917	275350
176.0	3487.470	-79.2582	28.8135	72.92	20.24	7943.1	75.52	17.42	9176.9	74.331	280890
178.0	3488.369	-79.2141	28.8254	72.95	19.91	7975.1	75.54	17.15	9211.4	76.759	286366

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
180.0	3489.258	-79.1697	28.8372	72.98	19.59	8007.6	75.55	16.88	9246.3	79.201	291780
182.0	3490.137	-79.1250	28.8491	73.01	19.28	8040.7	75.56	16.62	9281.7	81.657	297132
184.0	3491.006	-79.0801	28.8611	73.04	18.96	8074.2	75.57	16.36	9317.5	84.127	302423
186.0	3491.864	-79.0349	28.8731	73.07	18.65	8108.5	75.59	16.10	9354.0	86.612	307652
188.0	3492.713	-78.9895	28.8852	73.10	18.35	8143.4	75.60	15.84	9391.2	89.111	312821
190.0	3493.552	-78.9437	28.8973	73.13	18.05	8179.1	75.61	15.59	9428.9	91.625	317931
192.0	3494.381	-78.8977	28.9095	73.16	17.75	8215.3	75.63	15.34	9467.2	94.154	322982
194.0	3495.201	-78.8514	28.9217	73.19	17.46	8252.1	75.64	15.10	9506.0	96.698	327975
196.0	3496.011	-78.8048	28.9340	73.22	17.17	8289.4	75.65	14.85	9545.2	99.256	332910
198.0	3496.812	-78.7579	28.9463	73.25	16.88	8327.0	75.67	14.61	9584.7	101.830	337789
200.0	3497.603	-78.7107	28.9587	73.29	16.60	8365.3	75.68	14.38	9624.8	104.419	342609
202.0	3498.385	-78.6632	28.9711	73.32	16.32	8404.0	75.70	14.14	9665.4	107.023	347373
204.0	3499.157	-78.6155	28.9835	73.35	16.04	8443.4	75.71	13.91	9706.5	109.642	352080
206.0	3499.921	-78.5674	28.9961	73.38	15.77	8483.2	75.73	13.68	9748.1	112.276	356730
208.0	3500.675	-78.5191	29.0086	73.41	15.49	8523.6	75.74	13.45	9790.1	114.926	361325
210.0	3501.419	-78.4705	29.0213	73.44	15.23	8564.3	75.75	13.22	9832.5	117.592	365865
212.0	3502.155	-78.4215	29.0340	73.47	14.96	8605.5	75.77	13.00	9875.3	120.273	370348
214.0	3502.882	-78.3723	29.0467	73.50	14.70	8647.3	75.79	12.78	9918.6	122.969	374777
216.0	3503.600	-78.3227	29.0595	73.53	14.44	8689.5	75.80	12.56	9962.4	125.682	379151
218.0	3504.308	-78.2729	29.0723	73.57	14.18	8732.2	75.82	12.35	10006.6	128.411	383470
220.0	3505.008	-78.2227	29.0852	73.60	13.93	8775.4	75.83	12.13	10051.2	131.155	387736
222.0	3505.699	-78.1723	29.0981	73.63	13.68	8819.1	75.85	11.92	10096.3	133.916	391947
224.0	3506.381	-78.1215	29.1111	73.66	13.43	8863.3	75.87	11.71	10141.9	136.692	396105
226.0	3507.054	-78.0704	29.1241	73.70	13.19	8908.0	75.88	11.51	10187.9	139.485	400210
228.0	3507.719	-78.0190	29.1372	73.73	12.95	8953.2	75.90	11.30	10234.4	142.295	404262
230.0	3508.375	-77.9673	29.1504	73.76	12.71	8998.8	75.92	11.10	10281.3	145.121	408261
232.0	3509.022	-77.9152	29.1635	73.79	12.47	9044.9	75.93	10.90	10328.6	147.963	412208
234.0	3509.661	-77.8629	29.1768	73.83	12.24	9091.5	75.95	10.71	10376.4	150.822	416103
236.0	3510.291	-77.8102	29.1901	73.86	12.01	9138.6	75.97	10.51	10424.7	153.698	419946
238.0	3510.913	-77.7572	29.2034	73.89	11.79	9186.2	75.99	10.32	10473.4	156.591	423738
240.0	3511.526	-77.7039	29.2168	73.93	11.56	9234.2	76.01	10.13	10522.5	159.500	427479
242.0	3512.131	-77.6502	29.2303	73.96	11.34	9282.7	76.02	9.94	10572.0	162.427	431169
244.0	3512.728	-77.5962	29.2438	73.99	11.12	9331.7	76.04	9.76	10622.1	165.371	434809
246.0	3513.316	-77.5419	29.2573	74.03	10.91	9381.2	76.06	9.58	10672.7	168.332	438399
248.0	3513.897	-77.4872	29.2709	74.06	10.70	9431.3	76.08	9.40	10723.7	171.311	441939
250.0	3514.469	-77.4322	29.2846	74.09	10.49	9481.7	76.10	9.22	10775.1	174.307	445430
252.0	3515.033	-77.3769	29.2983	74.13	10.28	9532.7	76.12	9.04	10827.0	177.320	448872
254.0	3515.589	-77.3212	29.3121	74.16	10.08	9584.1	76.14	8.87	10879.3	180.352	452265
256.0	3516.137	-77.2652	29.3259	74.20	9.88	9636.0	76.16	8.70	10932.1	183.401	455610
258.0	3516.677	-77.2088	29.3398	74.23	9.68	9688.3	76.18	8.53	10985.3	186.468	458906
260.0	3517.210	-77.1521	29.3537	74.27	9.48	9741.2	76.20	8.36	11039.0	189.553	462155
262.0	3517.734	-77.0950	29.3676	74.30	9.29	9794.6	76.22	8.20	11093.1	192.656	465356
264.0	3518.251	-77.0376	29.3817	74.34	9.10	9848.4	76.24	8.03	11147.8	195.778	468511

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
266.0	3518.760	-76.9798	29.3957	74.37	8.92	9902.7	76.26	7.87	11202.8	198.918	471619
268.0	3519.261	-76.9217	29.4099	74.41	8.73	9957.5	76.29	7.72	11258.3	202.076	474680
270.0	3519.755	-76.8632	29.4240	74.45	8.55	10012.8	76.31	7.56	11314.3	205.253	477696
272.0	3520.241	-76.8043	29.4383	74.48	8.37	10068.5	76.33	7.41	11370.8	208.449	480665
274.0	3520.720	-76.7451	29.4525	74.52	8.20	10124.8	76.35	7.26	11427.8	211.663	483589
276.0	3521.191	-76.6855	29.4669	74.56	8.02	10181.6	76.37	7.11	11485.2	214.897	486468
278.0	3521.655	-76.6255	29.4813	74.59	7.85	10239.0	76.40	6.96	11543.2	218.149	489303
280.0	3522.112	-76.5652	29.4957	74.63	7.68	10296.8	76.42	6.81	11601.6	221.421	492093
282.0	3522.562	-76.5045	29.5102	74.67	7.52	10355.1	76.44	6.67	11660.5	224.713	494839
284.0	3523.004	-76.4434	29.5247	74.70	7.35	10413.8	76.47	6.53	11719.8	228.023	497542
286.0	3523.439	-76.3819	29.5393	74.74	7.19	10473.0	76.49	6.39	11779.6	231.354	500201
288.0	3523.867	-76.3200	29.5539	74.78	7.03	10532.7	76.52	6.25	11839.8	234.704	502818
290.0	3524.288	-76.2577	29.5686	74.82	6.88	10592.9	76.54	6.12	11900.5	238.074	505392
292.0	3524.702	-76.1951	29.5834	74.86	6.72	10653.6	76.57	5.99	11961.8	241.464	507923
294.0	3525.109	-76.1321	29.5982	74.89	6.57	10714.8	76.59	5.85	12023.4	244.874	510413
296.0	3525.510	-76.0686	29.6130	74.93	6.42	10776.5	76.62	5.73	12085.6	248.304	512861
298.0	3525.903	-76.0048	29.6279	74.97	6.28	10838.7	76.64	5.60	12148.3	251.755	515268
300.0	3526.290	-75.9406	29.6429	75.01	6.14	10901.4	76.67	5.48	12211.4	255.226	517634
302.0	3526.670	-75.8759	29.6579	75.05	5.99	10964.7	76.69	5.35	12275.1	258.718	519960
304.0	3527.044	-75.8109	29.6729	75.09	5.86	11028.4	76.72	5.23	12339.3	262.231	522246
306.0	3527.411	-75.7455	29.6880	75.13	5.72	11092.7	76.75	5.11	12404.0	265.764	524492
308.0	3527.772	-75.6796	29.7032	75.17	5.58	11157.5	76.77	5.00	12469.2	269.319	526700
310.0	3528.126	-75.6133	29.7184	75.21	5.45	11222.9	76.80	4.88	12535.0	272.895	528868
312.0	3528.474	-75.5466	29.7336	75.25	5.32	11288.7	76.83	4.77	12601.1	276.492	530998
314.0	3528.815	-75.4795	29.7489	75.29	5.20	11355.0	76.86	4.66	12667.8	280.111	533090
316.0	3529.151	-75.4119	29.7643	75.33	5.07	11421.8	76.88	4.55	12734.9	283.751	535144
318.0	3529.480	-75.3440	29.7797	75.37	4.95	11489.1	76.91	4.44	12802.6	287.414	537160
320.0	3529.803	-75.2756	29.7951	75.42	4.83	11557.0	76.94	4.33	12870.8	291.098	539140
322.0	3530.120	-75.2067	29.8106	75.46	4.71	11625.5	76.97	4.23	12939.6	294.804	541082
324.0	3530.431	-75.1375	29.8262	75.50	4.59	11694.5	77.00	4.13	13008.9	298.533	542989
326.0	3530.736	-75.0677	29.8418	75.54	4.48	11764.0	77.03	4.03	13078.7	302.284	544860
328.0	3531.036	-74.9976	29.8574	75.58	4.37	11834.0	77.06	3.93	13149.0	306.058	546696
330.0	3531.329	-74.9270	29.8731	75.63	4.26	11904.6	77.09	3.83	13219.8	309.854	548496
332.0	3531.617	-74.8559	29.8889	75.67	4.15	11975.7	77.12	3.74	13291.2	313.673	550263
334.0	3531.899	-74.7844	29.9047	75.71	4.04	12047.5	77.15	3.64	13363.2	317.515	551995
336.0	3532.176	-74.7124	29.9205	75.76	3.94	12119.8	77.18	3.55	13435.8	321.381	553693
338.0	3532.447	-74.6400	29.9364	75.80	3.84	12192.7	77.21	3.46	13508.9	325.270	555358
340.0	3532.713	-74.5671	29.9524	75.84	3.74	12266.0	77.24	3.37	13582.5	329.182	556990
342.0	3532.974	-74.4938	29.9684	75.89	3.64	12340.0	77.28	3.29	13656.7	333.118	558590
344.0	3533.229	-74.4199	29.9844	75.93	3.54	12414.5	77.31	3.20	13731.4	337.078	560158
346.0	3533.479	-74.3456	30.0005	75.98	3.45	12489.6	77.34	3.12	13806.8	341.063	561694
348.0	3533.724	-74.2708	30.0166	76.02	3.36	12565.3	77.37	3.04	13882.7	345.071	563199
350.0	3533.964	-74.1956	30.0328	76.07	3.27	12641.6	77.41	2.96	13959.2	349.104	564673

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
352.0	3534.198	-74.1198	30.0490	76.11	3.18	12718.5	77.44	2.88	14036.2	353.161	566117
354.0	3534.428	-74.0435	30.0653	76.16	3.10	12795.9	77.48	2.81	14113.8	357.243	567531
356.0	3534.653	-73.9668	30.0816	76.20	3.01	12874.0	77.51	2.73	14192.1	361.350	568916
358.0	3534.874	-73.8896	30.0980	76.25	2.93	12952.7	77.54	2.66	14270.9	365.482	570271
360.0	3535.089	-73.8118	30.1144	76.30	2.85	13032.0	77.58	2.59	14350.4	369.640	571599
362.0	3535.300	-73.7336	30.1309	76.34	2.77	13111.8	77.62	2.52	14430.3	373.823	572898
364.0	3535.506	-73.6548	30.1474	76.39	2.70	13192.2	77.65	2.45	14510.9	378.031	574170
366.0	3535.708	-73.5756	30.1639	76.44	2.62	13273.3	77.69	2.38	14592.1	382.266	575415
368.0	3535.906	-73.4958	30.1805	76.49	2.55	13355.0	77.72	2.32	14674.0	386.526	576633
370.0	3536.099	-73.4155	30.1972	76.53	2.48	13437.3	77.76	2.26	14756.4	390.813	577825
372.0	3536.288	-73.3346	30.2139	76.58	2.41	13520.2	77.80	2.19	14839.4	395.126	578992
374.0	3536.473	-73.2533	30.2306	76.63	2.34	13603.7	77.83	2.13	14923.1	399.466	580134
376.0	3536.654	-73.1714	30.2474	76.68	2.28	13687.9	77.87	2.08	15007.4	403.833	581251
378.0	3536.831	-73.0890	30.2642	76.73	2.21	13772.9	77.91	2.02	15092.5	408.226	582344
380.0	3537.004	-73.0060	30.2810	76.78	2.15	13858.6	77.95	1.96	15178.3	412.647	583414
382.0	3537.174	-72.9225	30.2979	76.83	2.09	13944.9	77.99	1.91	15264.8	417.095	584461
384.0	3537.339	-72.8384	30.3149	76.88	2.03	14031.9	78.02	1.86	15351.9	421.572	585485
386.0	3537.501	-72.7538	30.3319	76.93	1.98	14119.5	78.06	1.81	15439.6	426.076	586487
388.0	3537.660	-72.6686	30.3489	76.98	1.92	14207.8	78.10	1.76	15528.0	430.608	587469
390.0	3537.815	-72.5828	30.3659	77.03	1.87	14296.8	78.14	1.71	15617.1	435.168	588429
392.0	3537.966	-72.4965	30.3831	77.08	1.82	14386.6	78.18	1.66	15706.9	439.757	589369
394.0	3538.115	-72.4096	30.4002	77.13	1.77	14477.1	78.22	1.62	15797.5	444.374	590290
396.0	3538.260	-72.3221	30.4174	77.18	1.72	14568.4	78.26	1.58	15888.8	449.021	591191
398.0	3538.402	-72.2341	30.4346	77.23	1.67	14660.5	78.31	1.53	15981.1	453.697	592074
400.0	3538.542	-72.1454	30.4519	77.29	1.63	14753.3	78.35	1.49	16073.9	458.402	592939
402.0	3538.678	-72.0562	30.4692	77.34	1.58	14846.8	78.39	1.45	16167.5	463.137	593786
404.0	3538.812	-71.9663	30.4866	77.39	1.54	14941.0	78.43	1.42	16261.8	467.903	594617
406.0	3538.943	-71.8759	30.5039	77.45	1.50	15035.9	78.47	1.38	16356.8	472.698	595432
408.0	3539.071	-71.7848	30.5214	77.50	1.46	15131.8	78.52	1.35	16452.7	477.523	596231
410.0	3539.197	-71.6932	30.5388	77.55	1.43	15228.3	78.56	1.31	16549.3	482.380	597016
412.0	3539.321	-71.6009	30.5563	77.61	1.39	15325.7	78.61	1.28	16646.8	487.267	597786
414.0	3539.443	-71.5080	30.5738	77.66	1.36	15423.9	78.65	1.25	16745.0	492.185	598543
416.0	3539.562	-71.4144	30.5914	77.72	1.33	15522.8	78.69	1.22	16844.0	497.135	599287
418.0	3539.679	-71.3203	30.6090	77.77	1.30	15622.7	78.74	1.19	16943.9	502.117	600019
420.0	3539.795	-71.2254	30.6267	77.83	1.27	15723.5	78.78	1.17	17044.8	507.130	600738
422.0	3539.908	-71.1300	30.6443	77.88	1.24	15825.1	78.83	1.14	17146.4	512.176	601447
424.0	3540.020	-71.0338	30.6620	77.94	1.21	15927.5	78.88	1.12	17248.9	517.254	602146
426.0	3540.130	-70.9371	30.6798	78.00	1.19	16030.8	78.92	1.10	17352.3	522.365	602836
428.0	3540.239	-70.8396	30.6975	78.06	1.17	16135.1	78.97	1.08	17456.6	527.510	603517
430.0	3540.347	-70.7415	30.7153	78.11	1.15	16240.3	79.02	1.06	17561.9	532.687	604190
432.0	3540.453	-70.6427	30.7331	78.17	1.13	16346.5	79.07	1.04	17668.1	537.898	604856
434.0	3540.559	-70.5432	30.7510	78.23	1.11	16453.1	79.12	1.03	17774.7	543.143	605516
436.0	3540.663	-70.4431	30.7689	78.29	1.09	16561.0	79.16	1.01	17882.7	548.423	606170

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
438.0	3540.767	-70.3422	30.7868	78.35	1.08	16670.0	79.21	1.00	17991.7	553.737	606819
440.0	3540.870	-70.2406	30.8047	78.41	1.06	16779.8	79.26	0.99	18101.6	559.085	607464
442.0	3540.972	-70.1383	30.8227	78.47	1.05	16890.5	79.31	0.98	18212.4	564.470	608105
444.0	3541.074	-70.0354	30.8407	78.53	1.04	17002.2	79.36	0.97	18324.1	569.889	608744
446.0	3541.176	-69.9316	30.8587	78.59	1.03	17113.8	79.42	0.96	18435.7	575.344	609382
448.0	3541.276	-69.8273	30.8767	78.65	1.01	17207.8	79.47	0.94	18529.8	580.831	610012
450.0	3541.375	-69.7223	30.8948	78.71	0.98	17297.1	79.52	0.91	18619.2	586.348	610631
452.0	3541.472	-69.6168	30.9128	78.77	0.95	17386.8	79.57	0.89	18708.9	591.894	611237
454.0	3541.566	-69.5106	30.9308	78.83	0.93	17476.7	79.63	0.86	18798.8	597.468	611828
456.0	3541.658	-69.4039	30.9488	78.89	0.90	17567.5	79.68	0.84	18889.7	603.070	612406
458.0	3541.747	-69.2966	30.9668	78.96	0.87	17658.4	79.74	0.81	18980.7	608.702	612970
460.0	3541.835	-69.1886	30.9848	79.02	0.85	17749.9	79.79	0.79	19072.2	614.362	613521
462.0	3541.920	-69.0801	31.0028	79.08	0.82	17842.0	79.85	0.77	19164.3	620.052	614060
464.0	3542.004	-68.9710	31.0208	79.15	0.80	17934.6	79.90	0.75	19257.0	625.771	614587
466.0	3542.085	-68.8613	31.0387	79.21	0.78	18027.8	79.96	0.73	19350.2	631.520	615103
468.0	3542.165	-68.7509	31.0567	79.28	0.76	18121.8	80.01	0.71	19444.2	637.299	615609
470.0	3542.244	-68.6399	31.0746	79.34	0.74	18216.7	80.07	0.69	19539.1	643.108	616105
472.0	3542.321	-68.5283	31.0926	79.41	0.72	18312.1	80.13	0.68	19634.6	648.947	616592
474.0	3542.396	-68.4161	31.1105	79.47	0.71	18408.2	80.19	0.66	19730.7	654.816	617070
476.0	3542.471	-68.3033	31.1284	79.54	0.69	18504.8	80.24	0.65	19827.4	660.716	617541
478.0	3542.544	-68.1898	31.1462	79.61	0.68	18602.2	80.30	0.63	19924.9	666.648	618005
480.0	3542.616	-68.0756	31.1641	79.67	0.67	18700.4	80.36	0.62	20023.1	672.610	618463
482.0	3542.687	-67.9609	31.1819	79.74	0.66	18799.2	80.42	0.61	20121.9	678.604	618915
484.0	3542.758	-67.8454	31.1997	79.81	0.65	18898.5	80.48	0.60	20221.3	684.629	619362
486.0	3542.827	-67.7293	31.2175	79.88	0.64	18998.4	80.54	0.59	20321.2	690.686	619805
488.0	3542.896	-67.6126	31.2352	79.95	0.63	19099.0	80.60	0.59	20421.8	696.775	620245
490.0	3542.965	-67.4952	31.2530	80.02	0.62	19200.4	80.67	0.58	20523.2	702.896	620681
492.0	3543.033	-67.3771	31.2707	80.09	0.61	19302.4	80.73	0.57	20625.3	709.049	621116
494.0	3543.101	-67.2584	31.2883	80.16	0.61	19405.4	80.79	0.57	20728.3	715.235	621548
496.0	3543.169	-67.1389	31.3060	80.23	0.61	19509.4	80.85	0.57	20832.4	721.454	621980
498.0	3543.237	-67.0188	31.3236	80.30	0.60	19614.7	80.92	0.56	20937.7	727.706	622411
500.0	3543.305	-66.8980	31.3412	80.37	0.60	19720.7	80.98	0.56	21043.8	733.992	622843
502.0	3543.373	-66.7765	31.3587	80.44	0.60	19827.1	81.04	0.56	21150.1	740.312	623276
504.0	3543.442	-66.6543	31.3762	80.51	0.60	19933.7	81.11	0.56	21256.8	746.666	623711
506.0	3543.511	-66.5314	31.3937	80.59	0.60	20041.0	81.17	0.57	21364.1	753.054	624150
508.0	3543.581	-66.4077	31.4111	80.66	0.61	20149.6	81.24	0.57	21472.7	759.476	624594
510.0	3543.651	-66.2834	31.4285	80.73	0.61	20259.3	81.30	0.57	21582.5	765.933	625042
512.0	3543.723	-66.1583	31.4458	80.80	0.62	20370.0	81.37	0.58	21693.3	772.425	625495
514.0	3543.795	-66.0325	31.4631	80.88	0.62	20481.3	81.44	0.58	21804.6	778.952	625956
516.0	3543.869	-65.9060	31.4804	80.95	0.63	20593.8	81.50	0.59	21917.1	785.515	626424
518.0	3543.945	-65.7787	31.4976	81.03	0.64	20707.3	81.57	0.60	22030.6	792.114	626900
520.0	3544.022	-65.6506	31.5147	81.10	0.65	20821.7	81.64	0.62	22145.1	798.749	627389
522.0	3544.102	-65.5218	31.5318	81.18	0.67	20937.1	81.71	0.63	22260.5	805.424	627892

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
524.0	3544.183	-65.3923	31.5489	81.25	0.69	21053.4	81.78	0.65	22376.9	812.132	628406
S-II ENGINE CUTOFF											
524.040	3544.185	-65.3897	31.5492	81.26	0.69	21055.6	81.78	0.65	22379.1	812.267	628416
S-II/S-IVB SEPARATION COMMAND											
524.900	3544.220	-65.3338	31.5565	81.29	0.68	21068.1	81.81	0.64	22391.6	815.159	628637
526.0	3544.263	-65.2623	31.5658	81.33	0.65	21068.2	81.85	0.62	22391.7	818.858	628912
528.0	3544.340	-65.1322	31.5826	81.41	0.62	21068.7	81.92	0.58	22392.2	825.590	629395
530.0	3544.413	-65.0021	31.5993	81.49	0.58	21078.4	81.99	0.55	22402.0	832.323	629856
532.0	3544.482	-64.8717	31.6158	81.56	0.56	21108.9	82.07	0.53	22432.6	839.062	630294
534.0	3544.549	-64.7411	31.6322	81.64	0.54	21142.7	82.14	0.51	22466.4	845.812	630719
536.0	3544.614	-64.6103	31.6485	81.72	0.52	21178.2	82.21	0.49	22501.9	852.573	631131
538.0	3544.676	-64.4791	31.6647	81.80	0.50	21213.9	82.28	0.47	22537.7	859.345	631527
540.0	3544.736	-64.3477	31.6807	81.87	0.48	21250.2	82.35	0.45	22574.0	866.128	631907
542.0	3544.792	-64.2161	31.6966	81.95	0.45	21287.1	82.43	0.42	22610.9	872.923	632268
544.0	3544.845	-64.0841	31.7124	82.03	0.42	21324.3	82.50	0.39	22648.2	879.729	632608
546.0	3544.895	-63.9519	31.7281	82.11	0.39	21361.6	82.57	0.37	22685.5	886.548	632927
548.0	3544.941	-63.8194	31.7436	82.19	0.36	21399.0	82.64	0.34	22723.0	893.378	633223
550.0	3544.983	-63.6867	31.7590	82.27	0.33	21436.5	82.72	0.31	22760.5	900.220	633499
552.0	3545.023	-63.5536	31.7743	82.34	0.30	21474.2	82.79	0.29	22798.2	907.074	633753
554.0	3545.059	-63.4203	31.7895	82.42	0.28	21511.9	82.86	0.26	22835.9	913.940	633988
556.0	3545.091	-63.2867	31.8045	82.50	0.25	21549.6	82.94	0.24	22873.6	920.818	634204
558.0	3545.121	-63.1528	31.8194	82.58	0.22	21587.3	83.01	0.21	22911.4	927.708	634399
560.0	3545.147	-63.0186	31.8341	82.66	0.20	21625.1	83.09	0.19	22949.3	934.610	634574
562.0	3545.170	-62.8842	31.8488	82.74	0.17	21663.0	83.16	0.16	22987.2	941.524	634731
564.0	3545.190	-62.7495	31.8632	82.82	0.15	21701.0	83.24	0.14	23025.2	948.450	634868
566.0	3545.207	-62.6144	31.8776	82.90	0.12	21739.2	83.31	0.12	23063.4	955.389	634988
568.0	3545.221	-62.4792	31.8918	82.98	0.10	21777.5	83.39	0.10	23101.7	962.339	635089
570.0	3545.232	-62.3436	31.9059	83.06	0.08	21816.0	83.46	0.07	23140.2	969.302	635173
572.0	3545.241	-62.2077	31.9198	83.15	0.06	21854.6	83.54	0.05	23178.9	976.277	635241
574.0	3545.247	-62.0716	31.9336	83.23	0.04	21893.3	83.61	0.03	23217.6	983.264	635292
576.0	3545.250	-61.9352	31.9473	83.31	0.02	21932.2	83.69	0.02	23256.5	990.264	635327
578.0	3545.251	-61.7984	31.9608	83.39	-0.00	21971.3	83.77	-0.00	23295.5	997.276	635346
580.0	3545.249	-61.6615	31.9742	83.47	-0.02	22010.4	83.84	-0.02	23334.7	1004.301	635351
582.0	3545.245	-61.5242	31.9875	83.55	-0.04	22049.7	83.92	-0.04	23374.0	1011.338	635340
584.0	3545.239	-61.3866	32.0006	83.64	-0.06	22089.0	84.00	-0.06	23413.3	1018.388	635316
586.0	3545.230	-61.2487	32.0135	83.72	-0.08	22128.4	84.07	-0.07	23452.8	1025.450	635277
588.0	3545.219	-61.1106	32.0263	83.80	-0.09	22168.0	84.15	-0.09	23492.3	1032.525	635225
590.0	3545.206	-60.9722	32.0390	83.88	-0.11	22207.7	84.23	-0.10	23532.0	1039.613	635160
592.0	3545.191	-60.8334	32.0515	83.97	-0.12	22247.6	84.31	-0.12	23571.9	1046.713	635084

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
594.0	3545.174	-60.6944	32.0639	84.05	-0.14	22287.8	84.38	-0.13	23612.1	1053.826	634995
596.0	3545.156	-60.5551	32.0761	84.13	-0.15	22328.2	84.46	-0.14	23652.5	1060.952	634895
598.0	3545.135	-60.4155	32.0881	84.22	-0.17	22368.7	84.54	-0.16	23693.1	1068.091	634784
600.0	3545.113	-60.2756	32.1001	84.30	-0.18	22409.4	84.62	-0.17	23733.7	1075.243	634663
602.0	3545.090	-60.1354	32.1118	84.38	-0.19	22450.2	84.70	-0.18	23774.5	1082.408	634532
604.0	3545.064	-59.9950	32.1234	84.47	-0.20	22491.0	84.77	-0.19	23815.3	1089.586	634391
606.0	3545.037	-59.8542	32.1349	84.55	-0.21	22532.0	84.85	-0.20	23856.3	1096.778	634241
608.0	3545.009	-59.7131	32.1462	84.63	-0.22	22573.0	84.93	-0.21	23897.3	1103.982	634082
610.0	3544.980	-59.5718	32.1574	84.72	-0.23	22614.0	85.01	-0.22	23938.3	1111.200	633915
612.0	3544.949	-59.4301	32.1684	84.80	-0.24	22655.1	85.09	-0.23	23979.4	1118.430	633741
614.0	3544.917	-59.2881	32.1792	84.89	-0.25	22696.2	85.17	-0.23	24020.5	1125.674	633560
616.0	3544.885	-59.1459	32.1899	84.97	-0.25	22737.5	85.25	-0.24	24061.8	1132.931	633373
618.0	3544.851	-59.0033	32.2004	85.06	-0.26	22778.8	85.33	-0.25	24103.2	1140.202	633180
620.0	3544.817	-58.8605	32.2108	85.14	-0.27	22820.3	85.41	-0.25	24144.6	1147.485	632982
622.0	3544.781	-58.7174	32.2210	85.23	-0.27	22861.9	85.49	-0.25	24186.2	1154.782	632781
624.0	3544.746	-58.5739	32.2310	85.31	-0.27	22903.6	85.57	-0.26	24227.9	1162.093	632575
626.0	3544.710	-58.4302	32.2409	85.40	-0.28	22945.5	85.65	-0.26	24269.8	1169.416	632367
628.0	3544.673	-58.2862	32.2506	85.48	-0.28	22987.4	85.73	-0.26	24311.7	1176.754	632156
630.0	3544.637	-58.1419	32.2601	85.57	-0.28	23029.5	85.81	-0.26	24353.7	1184.104	631944
632.0	3544.600	-57.9973	32.2695	85.66	-0.28	23071.6	85.89	-0.26	24395.9	1191.468	631730
634.0	3544.563	-57.8523	32.2787	85.74	-0.28	23114.1	85.97	-0.26	24438.3	1198.846	631515
636.0	3544.526	-57.7071	32.2878	85.83	-0.28	23156.8	86.05	-0.26	24481.0	1206.238	631300
638.0	3544.489	-57.5616	32.2967	85.92	-0.28	23199.7	86.14	-0.26	24523.9	1213.643	631086
640.0	3544.452	-57.4158	32.3054	86.00	-0.27	23242.8	86.22	-0.26	24567.1	1221.062	630872
642.0	3544.415	-57.2697	32.3139	86.09	-0.27	23286.1	86.30	-0.26	24610.3	1228.495	630659
644.0	3544.379	-57.1232	32.3223	86.18	-0.27	23329.4	86.38	-0.25	24653.6	1235.942	630449
646.0	3544.343	-56.9765	32.3305	86.26	-0.26	23372.6	86.46	-0.25	24696.8	1243.403	630241
648.0	3544.308	-56.8295	32.3385	86.35	-0.26	23415.9	86.55	-0.25	24740.1	1250.877	630035
650.0	3544.274	-56.6822	32.3463	86.44	-0.25	23459.2	86.63	-0.24	24783.4	1258.366	629834
652.0	3544.240	-56.5345	32.3540	86.53	-0.25	23502.7	86.71	-0.24	24826.9	1265.868	629636
654.0	3544.207	-56.3866	32.3615	86.61	-0.24	23546.4	86.79	-0.23	24870.6	1273.385	629443
656.0	3544.175	-56.2384	32.3688	86.70	-0.23	23590.2	86.88	-0.22	24914.4	1280.915	629257
658.0	3544.144	-56.0898	32.3759	86.79	-0.22	23634.2	86.96	-0.21	24958.4	1288.460	629079
660.0	3544.115	-55.9410	32.3829	86.88	-0.21	23678.3	87.04	-0.20	25002.4	1296.018	628910
662.0	3544.087	-55.7919	32.3897	86.97	-0.20	23722.5	87.13	-0.18	25046.6	1303.591	628750
664.0	3544.062	-55.6424	32.3963	87.05	-0.18	23766.7	87.21	-0.17	25090.9	1311.178	628601
666.0	3544.038	-55.4927	32.4027	87.14	-0.17	23811.1	87.29	-0.16	25135.2	1318.780	628463
668.0	3544.016	-55.3426	32.4089	87.23	-0.15	23855.6	87.38	-0.15	25179.7	1326.395	628336
670.0	3543.996	-55.1923	32.4149	87.32	-0.14	23900.3	87.46	-0.13	25224.5	1334.025	628221
672.0	3543.978	-55.0416	32.4208	87.41	-0.12	23945.2	87.55	-0.12	25269.4	1341.669	628119
674.0	3543.962	-54.8907	32.4264	87.50	-0.10	23990.2	87.63	-0.10	25314.4	1349.328	628030
676.0	3543.949	-54.7394	32.4319	87.59	-0.09	24035.2	87.72	-0.08	25359.4	1357.001	627955
678.0	3543.938	-54.5878	32.4372	87.68	-0.07	24080.3	87.80	-0.07	25404.4	1364.689	627895

TABLE C-III. GEOGRAPHIC POLAR COORDINATES - ASCENT PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	RANGE NM	ALTITUDE FT
680.0	3543.930	-54.4360	32.4423	87.77	-0.05	24125.5	87.89	-0.05	25449.6	1372.391	627851
682.0	3543.924	-54.2838	32.4472	87.86	-0.03	24170.7	87.97	-0.03	25494.9	1380.107	627820
684.0	3543.921	-54.1313	32.4519	87.95	-0.01	24216.1	88.06	-0.01	25540.2	1387.838	627808
	S-IVB FIRST GUIDANCE CUTOFF										
684.980	3543.920	-54.0565	32.4541	87.99	-0.00	24238.3	88.10	-0.00	25562.4	1391.631	627807
686.0	3543.920	-53.9786	32.4564	88.04	0.00	24244.1	88.14	0.00	25568.3	1395.581	627809
688.0	3543.920	-53.8258	32.4607	88.13	0.00	24243.9	88.23	0.00	25568.0	1403.327	627814
690.0	3543.921	-53.6729	32.4648	88.22	0.00	24243.6	88.32	0.00	25567.8	1411.074	627820
692.0	3543.921	-53.5201	32.4687	88.32	-0.00	24243.4	88.40	-0.00	25567.6	1418.820	627825
694.0	3543.921	-53.3672	32.4724	88.41	-0.00	24243.4	88.49	-0.00	25567.5	1426.567	627829
	PARKING ORBIT INSERTION										
694.980	3543.919	-53.2923	32.4741	88.45	0.00	24242.9	88.53	0.00	25567.0	1430.363	627819

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
PARKING ORBIT INSERTION								
694.980	3543.919	-53.2923	32.4741	32.6487	88.53	0.00	25567.0	103.326
700.0	3543.919	-52.9086	32.4822	32.6568	88.75	0.00	25567.0	103.327
750.0	3543.920	-49.0845	32.4920	32.6666	90.92	-0.00	25567.8	103.330
800.0	3543.919	-45.2652	32.3730	32.5472	93.09	-0.00	25568.6	103.307
850.0	3543.918	-41.4620	32.1261	32.2996	95.23	-0.00	25569.4	103.261
900.0	3543.916	-37.6859	31.7532	31.9256	97.35	-0.00	25570.1	103.192
950.0	3543.914	-33.9470	31.2571	31.4281	99.42	-0.00	25570.8	103.100
1000.0	3543.911	-30.2542	30.6415	30.8105	101.43	-0.00	25571.5	102.988
1050.0	3543.908	-26.6152	29.9107	30.0773	103.37	-0.00	25572.2	102.857
1100.0	3543.905	-23.0365	29.0696	29.2333	105.24	-0.00	25572.9	102.708
1150.0	3543.900	-19.5228	28.1238	28.2840	107.03	-0.00	25573.6	102.542
1200.0	3543.895	-16.0775	27.0789	27.2352	108.73	-0.00	25574.4	102.363
1250.0	3543.888	-12.7027	25.9412	26.0929	110.33	-0.00	25575.2	102.172
1300.0	3543.879	-9.3990	24.7168	24.8633	111.84	-0.00	25576.1	101.972
1350.0	3543.869	-6.1659	23.4120	23.5527	113.25	-0.00	25577.0	101.766
1400.0	3543.857	-3.0018	22.0331	22.1673	114.55	-0.00	25577.9	101.555
1450.0	3543.843	0.0956	20.5863	20.7133	115.76	-0.00	25578.8	101.343
1500.0	3543.827	3.1297	19.0777	19.1969	116.86	-0.00	25579.7	101.132
1550.0	3543.809	6.1041	17.5132	17.6239	117.87	-0.01	25580.6	100.926
1600.0	3543.789	9.0234	15.8986	16.0003	118.77	-0.01	25581.6	100.726
1650.0	3543.768	11.8923	14.2396	14.3317	119.57	-0.01	25582.5	100.536
1700.0	3543.744	14.7157	12.5416	12.6235	120.28	-0.01	25583.3	100.357
1750.0	3543.719	17.4991	10.8099	10.8810	120.88	-0.01	25584.2	100.193
1800.0	3543.691	20.2480	9.0496	9.1096	121.39	-0.01	25584.9	100.044
1850.0	3543.662	22.9679	7.2657	7.3141	121.81	-0.01	25585.7	99.914
1900.0	3543.632	25.6645	5.4630	5.4996	122.14	-0.01	25586.3	99.803
1950.0	3543.600	28.3438	3.6463	3.6708	122.37	-0.01	25586.9	99.713
2000.0	3543.567	31.0114	1.8204	1.8326	122.50	-0.01	25587.4	99.645
2050.0	3543.533	33.6733	-0.0102	-0.0103	122.55	-0.01	25587.9	99.599
2100.0	3543.499	36.3353	-1.8408	-1.8532	122.50	-0.01	25588.3	99.576
2150.0	3543.464	39.0032	-3.6668	-3.6914	122.36	-0.01	25588.6	99.577
2200.0	3543.429	41.6830	-5.4836	-5.5203	122.13	-0.01	25588.8	99.600
2250.0	3543.394	44.3804	-7.2864	-7.3350	121.81	-0.01	25589.0	99.646
2300.0	3543.360	47.1013	-9.0705	-9.1306	121.39	-0.01	25589.0	99.714
2350.0	3543.327	49.8514	-10.8310	-10.9022	120.88	-0.01	25589.0	99.802
2400.0	3543.295	52.6362	-12.5629	-12.6448	120.27	-0.01	25589.0	99.910
2450.0	3543.266	55.4613	-14.2611	-14.3532	119.56	-0.01	25588.8	100.036
2500.0	3543.240	58.3320	-15.9202	-16.0220	118.76	-0.01	25588.6	100.178
2550.0	3543.216	61.2534	-17.5349	-17.6457	117.85	-0.01	25588.4	100.335
2600.0	3543.196	64.2303	-19.0994	-19.2187	116.85	-0.00	25588.0	100.504

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
2650.0	3543.181	67.2669	-20.6080	-20.7350	115.74	-0.00	25587.7	100.684
2700.0	3543.170	70.3671	-22.0546	-22.1888	114.53	-0.00	25587.2	100.872
2750.0	3543.165	73.5341	-23.4332	-23.5739	113.23	-0.00	25586.8	101.065
2800.0	3543.166	76.7704	-24.7375	-24.8841	111.82	0.00	25586.2	101.262
2850.0	3543.173	80.0774	-25.9612	-26.1130	110.31	0.00	25585.7	101.461
2900.0	3543.186	83.4557	-27.0981	-27.2545	108.70	0.00	25585.1	101.658
2950.0	3543.207	86.9045	-28.1419	-28.3022	107.00	0.01	25584.5	101.852
3000.0	3543.236	90.4217	-29.0864	-29.2502	105.21	0.01	25583.8	102.041
3050.0	3543.272	94.0040	-29.9259	-30.0926	103.34	0.01	25583.2	102.223
3100.0	3543.316	97.6464	-30.6549	-30.8240	101.39	0.01	25582.6	102.395
3150.0	3543.368	101.3426	-31.2685	-31.4395	99.37	0.02	25582.0	102.557
3200.0	3543.428	105.0847	-31.7623	-31.9348	97.30	0.02	25581.4	102.706
3250.0	3543.497	108.8638	-32.1327	-32.3063	95.19	0.02	25580.8	102.842
3300.0	3543.574	112.6696	-32.3769	-32.5512	93.04	0.02	25580.2	102.964
3350.0	3543.660	116.4914	-32.4931	-32.6677	90.87	0.02	25579.7	103.070
3400.0	3543.753	120.3175	-32.4803	-32.6549	88.70	0.03	25579.1	103.162
3450.0	3543.855	124.1366	-32.3387	-32.5129	86.53	0.03	25578.6	103.237
3500.0	3543.964	127.9372	-32.0694	-32.2428	84.39	0.03	25578.1	103.297
3550.0	3544.080	131.7086	-31.6745	-31.8467	82.28	0.03	25577.6	103.342
3600.0	3544.204	135.4408	-31.1570	-31.3276	80.22	0.03	25577.1	103.372
3650.0	3544.333	139.1251	-30.5206	-30.6892	78.22	0.04	25576.7	103.389
3700.0	3544.469	142.7540	-29.7699	-29.9360	76.29	0.04	25576.3	103.393
3750.0	3544.610	146.3214	-28.9100	-29.0731	74.44	0.04	25575.9	103.385
3800.0	3544.755	149.8227	-27.9463	-28.1059	72.66	0.04	25575.5	103.367
3850.0	3544.904	153.2549	-26.8849	-27.0404	70.98	0.04	25575.1	103.341
3900.0	3545.057	156.6161	-25.7318	-25.8826	69.40	0.04	25574.7	103.309
3950.0	3545.212	159.9059	-24.4933	-24.6388	67.91	0.04	25574.4	103.271
4000.0	3545.369	163.1251	-23.1758	-23.3153	66.52	0.04	25574.0	103.231
4050.0	3545.527	166.2753	-21.7854	-21.9183	65.23	0.04	25573.6	103.190
4100.0	3545.685	169.3592	-20.3284	-20.4540	64.04	0.04	25573.3	103.150
4150.0	3545.842	172.3800	-18.8109	-18.9286	62.96	0.04	25572.9	103.114
4200.0	3545.998	175.3418	-17.2387	-17.3479	61.97	0.04	25572.5	103.082
4250.0	3546.151	178.2490	-15.6178	-15.7178	61.09	0.04	25572.1	103.058
4300.0	3546.302	-178.8936	-13.9536	-14.0439	60.30	0.04	25571.6	103.042
4350.0	3546.449	-176.0809	-12.2515	-12.3316	59.62	0.04	25571.2	103.037
4400.0	3546.592	-173.3076	-10.5169	-10.5862	59.02	0.04	25570.7	103.044
4450.0	3546.729	-170.5681	-8.7547	-8.8128	58.53	0.04	25570.2	103.064
4500.0	3546.862	-167.8568	-6.9700	-7.0165	58.13	0.04	25569.7	103.098
4550.0	3546.988	-165.1679	-5.1676	-5.2022	57.82	0.03	25569.1	103.148
4600.0	3547.107	-162.4958	-3.3522	-3.3747	57.61	0.03	25568.5	103.213
4650.0	3547.220	-159.8345	-1.5284	-1.5387	57.48	0.03	25567.9	103.294
4700.0	3547.325	-157.1783	0.2991	0.3011	57.45	0.03	25567.2	103.391
4750.0	3547.423	-154.5212	2.1258	2.1401	57.51	0.03	25566.6	103.505

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
4800.0	3547.513	-151.8576	3.9470	3.9735	57.67	0.02	25565.9	103.634
4850.0	3547.555	-149.1815	5.7581	5.7967	57.91	0.02	25565.1	103.777
4900.0	3547.668	-146.4871	7.5546	7.6049	58.25	0.02	25564.4	103.935
4950.0	3547.734	-143.7686	9.3316	9.3933	58.68	0.02	25563.7	104.105
5000.0	3547.791	-141.0205	11.0842	11.1570	59.21	0.01	25562.9	104.286
5050.0	3547.840	-138.2372	12.8076	12.8910	59.83	0.01	25562.1	104.476
5100.0	3547.881	-135.4130	14.4966	14.5901	60.55	0.01	25561.4	104.674
5150.0	3547.915	-132.5429	16.1459	16.2489	61.36	0.01	25560.7	104.878
5200.0	3547.941	-129.6218	17.7501	17.8621	62.28	0.01	25559.9	105.085
5250.0	3547.960	-126.6450	19.3035	19.4239	63.29	0.00	25559.2	105.293
5300.0	3547.972	-123.6083	20.8005	20.9286	64.41	0.00	25558.6	105.500
5350.0	3547.977	-120.5078	22.2351	22.3702	65.63	0.00	25557.9	105.704
5400.0	3547.976	-117.3405	23.6012	23.7427	66.95	-0.00	25557.4	105.901
5450.0	3547.970	-114.1042	24.8925	25.0398	68.37	-0.00	25556.8	106.090
5500.0	3547.958	-110.7972	26.1030	26.2553	69.88	-0.00	25556.3	106.269
5550.0	3547.941	-107.4194	27.2262	27.3831	71.50	-0.01	25555.9	106.434
5600.0	3547.920	-103.9715	28.2561	28.4169	73.20	-0.01	25555.6	106.584
5650.0	3547.895	-100.4557	29.1866	29.3507	75.00	-0.01	25555.3	106.718
5700.0	3547.866	-96.8756	30.0120	30.1789	76.88	-0.01	25555.1	106.832
5750.0	3547.834	-93.2361	30.7269	30.8962	78.83	-0.01	25554.9	106.926
5800.0	3547.799	-89.5437	31.3264	31.4976	80.84	-0.01	25554.9	106.998
5850.0	3547.762	-85.8062	31.8063	31.9789	82.92	-0.01	25555.0	107.047
5900.0	3547.723	-82.0328	32.1630	32.3367	85.03	-0.01	25555.1	107.073
5950.0	3547.681	-78.2335	32.3939	32.5682	87.18	-0.01	25555.3	107.074
6000.0	3547.639	-74.4192	32.4972	32.6718	89.34	-0.01	25555.7	107.050
6050.0	3547.595	-70.6014	32.4720	32.6465	91.51	-0.01	25556.1	107.002
6100.0	3547.550	-66.7914	32.3186	32.4927	93.67	-0.01	25556.6	106.929
6150.0	3547.504	-63.0005	32.0380	32.2113	95.80	-0.01	25557.1	106.832
6200.0	3547.458	-59.2393	31.6326	31.8047	97.90	-0.01	25557.8	106.712
6250.0	3547.411	-55.5176	31.1052	31.2757	99.95	-0.01	25558.5	106.571
6300.0	3547.364	-51.8440	30.4597	30.6281	101.95	-0.01	25559.3	106.409
6350.0	3547.316	-48.2259	29.7005	29.8664	103.87	-0.01	25560.2	106.228
6400.0	3547.268	-44.6691	28.8328	28.9956	105.72	-0.01	25561.1	106.031
6450.0	3547.220	-41.1781	27.8620	28.0213	107.48	-0.01	25562.1	105.818
6500.0	3547.171	-37.7559	26.7941	26.9493	109.15	-0.01	25563.2	105.593
6550.0	3547.122	-34.4042	25.6351	25.7855	110.73	-0.01	25564.2	105.358
6600.0	3547.072	-31.1233	24.3913	24.5363	112.21	-0.01	25565.3	105.116
6650.0	3547.022	-27.9125	23.0688	23.2079	113.59	-0.01	25566.4	104.869
6700.0	3546.971	-24.7699	21.6740	21.8064	114.87	-0.01	25567.5	104.619
6750.0	3546.920	-21.6930	20.2129	20.3380	116.05	-0.01	25568.7	104.370
6800.0	3546.867	-18.6783	18.6917	18.8088	117.12	-0.01	25569.8	104.125
6850.0	3546.814	-15.7220	17.1162	17.2247	118.10	-0.01	25570.9	103.885
6900.0	3546.760	-12.8195	15.4921	15.5915	118.98	-0.01	25571.9	103.654

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
6950.0	3546.705	-9.9660	13.8251	13.9146	119.75	-0.02	25573.0	103.434
7000.0	3546.649	-7.1565	12.1204	12.1996	120.43	-0.02	25574.0	103.227
7050.0	3546.592	-4.3856	10.3833	10.4517	121.02	-0.02	25574.9	103.035
7100.0	3546.535	-1.6478	8.6188	8.6760	121.50	-0.02	25575.8	102.861
7150.0	3546.476	1.0625	6.8320	6.8776	121.90	-0.02	25576.6	102.707
7200.0	3546.417	3.7512	5.0276	5.0613	122.20	-0.02	25577.4	102.572
7250.0	3546.358	6.4238	3.2104	3.2320	122.41	-0.02	25578.1	102.460
7300.0	3546.298	9.0863	1.3850	1.3943	122.52	-0.02	25578.7	102.371
7350.0	3546.238	11.7445	-0.4439	-0.4469	122.55	-0.02	25579.2	102.305
7400.0	3546.179	14.4042	-2.2718	-2.2871	122.48	-0.02	25579.7	102.263
7450.0	3546.120	17.0713	-4.0941	-4.1216	122.32	-0.02	25580.1	102.245
7500.0	3546.062	19.7515	-5.9060	-5.9456	122.06	-0.02	25580.4	102.251
7550.0	3546.005	22.4508	-7.7030	-7.7543	121.72	-0.02	25580.6	102.280
7600.0	3545.950	25.1748	-9.4802	-9.5429	121.28	-0.01	25580.7	102.331
7650.0	3545.897	27.9293	-11.2326	-11.3064	120.74	-0.01	25580.7	102.404
7700.0	3545.847	30.7197	-12.9554	-13.0398	120.11	-0.01	25580.7	102.496
7750.0	3545.800	33.5517	-14.6434	-14.7378	119.39	-0.01	25580.6	102.608
7800.0	3545.757	36.4303	-16.2912	-16.3951	118.56	-0.01	25580.4	102.736
7850.0	3545.718	39.3606	-17.8933	-18.0061	117.63	-0.01	25580.2	102.879
7900.0	3545.684	42.3473	-19.4441	-19.5652	116.61	-0.01	25579.8	103.035
7950.0	3545.654	45.3946	-20.9378	-21.0665	115.48	-0.01	25579.5	103.202
8000.0	3545.631	48.5061	-22.3683	-22.5040	114.25	-0.01	25579.1	103.377
8050.0	3545.614	51.6850	-23.7295	-23.8716	112.92	-0.00	25578.6	103.558
8100.0	3545.604	54.9334	-25.0152	-25.1630	111.49	-0.00	25578.1	103.743
8150.0	3545.601	58.2526	-26.2191	-26.3719	109.96	0.00	25577.5	103.930
8200.0	3545.605	61.6429	-27.3349	-27.4922	108.33	0.00	25577.0	104.116
8250.0	3545.618	65.1032	-28.3565	-28.5176	106.62	0.00	25576.4	104.299
8300.0	3545.638	68.6312	-29.2778	-29.4422	104.81	0.01	25575.8	104.477
8350.0	3545.668	72.2233	-30.0930	-30.2602	102.92	0.01	25575.2	104.648
8400.0	3545.706	75.8741	-30.7968	-30.9663	100.96	0.01	25574.6	104.810
8450.0	3545.753	79.5770	-31.3845	-31.5558	98.93	0.01	25574.0	104.962
8500.0	3545.809	83.3239	-31.8517	-32.0244	96.86	0.02	25573.3	105.102
8550.0	3545.873	87.1057	-32.1951	-32.3689	94.73	0.02	25572.7	105.230
8600.0	3545.947	90.9119	-32.4121	-32.5865	92.58	0.02	25572.2	105.343
8650.0	3546.030	94.7317	-32.5011	-32.6757	90.41	0.02	25571.6	105.442
8700.0	3546.122	98.5534	-32.4612	-32.6358	88.24	0.03	25571.0	105.526
8750.0	3546.221	102.3656	-32.2930	-32.4670	86.09	0.03	25570.5	105.595
8800.0	3546.329	106.1571	-31.9977	-32.1709	83.95	0.03	25570.0	105.649
8850.0	3546.445	109.9173	-31.5775	-31.7495	81.85	0.03	25569.5	105.689
8900.0	3546.567	113.6365	-31.0357	-31.2060	79.81	0.03	25569.0	105.714
8950.0	3546.697	117.3062	-30.3762	-30.5443	77.82	0.04	25568.5	105.727
9000.0	3546.832	120.9193	-29.6035	-29.7691	75.91	0.04	25568.1	105.727
9050.0	3546.973	124.4699	-28.7229	-28.8854	74.07	0.04	25567.6	105.716

TABLE C-IV. GEOGRAPHIC POLAR COORDINATES - ORBITAL PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	GD LAT DEG N	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE NM
9100.0	3547.118	127.9538	-27.7400	-27.8989	72.32	0.04	25567.2	105.696
9150.0	3547.268	131.3683	-26.6607	-26.8154	70.66	0.04	25566.8	105.669
9200.0	3547.421	134.7117	-25.4912	-25.6410	69.09	0.04	25566.4	105.635
9250.0	3547.576	137.9840	-24.2377	-24.3821	67.62	0.04	25566.0	105.597
9300.0	3547.733	141.1860	-22.9065	-23.0448	66.25	0.04	25565.6	105.556
9350.0	3547.891	144.3196	-21.5039	-21.6355	64.99	0.04	25565.2	105.516
9400.0	3548.049	147.3876	-20.0360	-20.1602	63.82	0.04	25564.8	105.477
9450.0	3548.206	150.3934	-18.5089	-18.6250	62.76	0.04	25564.3	105.441
9500.0	3548.362	153.3411	-16.9284	-17.0359	61.79	0.04	25563.9	105.411
9550.0	3548.515	156.2352	-15.3003	-15.3985	60.93	0.04	25563.4	105.388
9600.0	3548.664	159.0806	-13.6301	-13.7185	60.16	0.04	25563.0	105.375
9650.0	3548.810	161.8823	-11.9231	-12.0011	59.50	0.04	25562.4	105.371
INITIATE S-IVB RESTART SEQUENCE								
9659.540	3548.838	162.4124	-11.5937	-11.6697	59.38	0.04	25562.3	105.372

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
	INITIATE S-IVB RESTART SEQUENCE								
9659.540	-31399188	-6580198	-17656057	21060.9	-6460.8	-10135.8	13.22	7.57	22.65
9660.0	-31389498	-6583169	-17660717	21067.0	-6457.3	-10125.4	13.21	7.57	22.65
9670.0	-31178172	-6647362	-17760836	21197.8	-6381.1	-9898.3	12.94	7.67	22.77
9680.0	-30965552	-6710787	-17858679	21325.9	-6303.9	-9670.0	12.68	7.77	22.89
9690.0	-30751664	-6773436	-17954233	21451.3	-6225.6	-9440.6	12.41	7.87	23.00
9700.0	-30536535	-6835297	-18047487	21574.0	-6146.4	-9210.1	12.14	7.97	23.11
9710.0	-30320193	-6896361	-18138430	21694.0	-6066.2	-8978.4	11.87	8.07	23.21
9720.0	-30102665	-6956618	-18227052	21811.3	-5985.0	-8745.8	11.59	8.17	23.32
9730.0	-29883977	-7016058	-18313342	21925.8	-5902.9	-8512.1	11.32	8.26	23.42
9740.0	-29664158	-7074672	-18397291	22037.6	-5819.8	-8277.4	11.04	8.36	23.52
9750.0	-29443235	-7132451	-18478888	22146.6	-5735.8	-8041.8	10.76	8.45	23.61
9760.0	-29221236	-7189384	-18558124	22252.8	-5650.8	-7805.2	10.48	8.54	23.70
9770.0	-28998189	-7245463	-18634990	22356.2	-5564.9	-7567.8	10.20	8.64	23.79
9780.0	-28774122	-7300679	-18709476	22456.8	-5478.1	-7329.4	9.92	8.73	23.88
9790.0	-28549063	-7355021	-18781576	22554.5	-5390.3	-7090.3	9.63	8.82	23.96
9800.0	-28323041	-7408482	-18851279	22649.5	-5301.7	-6850.3	9.35	8.91	24.04
9810.0	-28096084	-7461053	-18918579	22741.5	-5212.2	-6609.5	9.06	8.99	24.11
9820.0	-27868220	-7512724	-18983467	22830.8	-5121.8	-6368.0	8.78	9.08	24.19
9830.0	-27639478	-7563487	-19045937	22917.1	-5030.6	-6125.8	8.49	9.17	24.26
9840.0	-27409887	-7613333	-19105981	23000.6	-4938.5	-5882.9	8.20	9.25	24.32
9850.0	-27179476	-7662254	-19163593	23081.2	-4845.6	-5639.4	7.91	9.33	24.39
9860.0	-26948274	-7710242	-19218766	23158.8	-4751.9	-5395.2	7.62	9.42	24.45
9870.0	-26716309	-7757289	-19271495	23233.6	-4657.3	-5150.4	7.33	9.50	24.50
9880.0	-26483612	-7803386	-19321773	23305.4	-4561.9	-4905.1	7.04	9.58	24.56
9890.0	-26250211	-7848525	-19369595	23374.3	-4465.8	-4659.3	6.74	9.66	24.61
9900.0	-26016136	-7892698	-19414957	23440.3	-4368.8	-4412.9	6.45	9.73	24.66
9910.0	-25781416	-7935899	-19457852	23503.3	-4271.1	-4166.1	6.15	9.81	24.70
9920.0	-25546080	-7978118	-19498278	23563.3	-4172.7	-3918.9	5.86	9.88	24.74
9930.0	-25310159	-8019349	-19536228	23620.4	-4073.4	-3671.2	5.56	9.96	24.78
9940.0	-25073682	-8059585	-19571701	23674.5	-3973.5	-3423.2	5.26	10.03	24.82
9950.0	-24836679	-8098817	-19604692	23725.6	-3872.8	-3174.9	4.96	10.10	24.85
9960.0	-24599179	-8137039	-19635197	23773.8	-3771.5	-2926.2	4.67	10.17	24.88
9970.0	-24361213	-8174244	-19663215	23819.0	-3669.4	-2677.3	4.37	10.24	24.91
9980.0	-24122810	-8210426	-19688742	23861.1	-3566.7	-2428.1	4.07	10.31	24.93
9990.0	-23884001	-8245576	-19711777	23900.3	-3463.3	-2178.7	3.77	10.37	24.95
10000.0	-23644815	-8279689	-19732317	23936.4	-3359.2	-1929.2	3.46	10.44	24.96
10010.0	-23405282	-8312759	-19750360	23969.6	-3254.5	-1679.5	3.16	10.50	24.98
10020.0	-23165434	-8344778	-19765906	23999.7	-3149.2	-1429.7	2.86	10.56	24.99
10030.0	-22925299	-8375741	-19778953	24026.8	-3043.3	-1179.8	2.56	10.62	24.99
10040.0	-22684908	-8405642	-19789501	24050.9	-2936.8	-929.8	2.26	10.68	25.00

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
10050.0	-22444292	-8434475	-19797549	24071.9	-2829.6	-679.8	1.95	10.74	25.00
10060.0	-22203480	-8462233	-19803097	24089.9	-2721.9	-429.9	1.65	10.80	24.99
10070.0	-21962504	-8488912	-19806146	24104.9	-2613.7	-179.9	1.35	10.85	24.99
10080.0	-21721392	-8514505	-19806696	24116.9	-2504.9	69.9	1.04	10.91	24.98
10090.0	-21480176	-8539008	-19804748	24125.8	-2395.6	319.6	0.74	10.96	24.97
10100.0	-21238886	-8562415	-19800304	24131.7	-2285.7	569.2	0.44	11.01	24.95
10110.0	-20997553	-8584721	-19793364	24134.5	-2175.4	818.7	0.13	11.06	24.93
10120.0	-20756206	-8605922	-19783931	24134.3	-2064.6	1067.9	-0.17	11.11	24.91
10130.0	-20514876	-8626011	-19772008	24131.1	-1953.3	1316.9	-0.47	11.15	24.89
10140.0	-20273594	-8644986	-19757595	24124.9	-1841.5	1565.6	-0.78	11.20	24.86
10150.0	-20032389	-8662840	-19740697	24115.6	-1729.3	1814.0	-1.08	11.24	24.83
10160.0	-19791293	-8679571	-19721316	24103.2	-1616.7	2062.1	-1.38	11.28	24.79
10170.0	-19550334	-8695173	-19699456	24087.9	-1503.7	2309.8	-1.69	11.32	24.75
10180.0	-19309545	-8709643	-19675120	24069.5	-1390.2	2557.2	-1.99	11.36	24.71
10190.0	-19068954	-8722977	-19648313	24048.1	-1276.4	2804.1	-2.29	11.40	24.67
10200.0	-18828592	-8735170	-19619039	24023.8	-1162.2	3050.6	-2.59	11.44	24.62
10210.0	-18588489	-8746220	-19587303	23996.4	-1047.7	3296.6	-2.89	11.47	24.57
10220.0	-18348675	-8756123	-19553109	23966.0	-932.8	3542.1	-3.19	11.50	24.52
	S-IVB RESTART COMMAND								
10229.510	-18120907	-8764473	-19518316	23934.3	-823.3	3775.1	-3.46	11.54	24.47
10230.0	-18109180	-8764875	-19516464	23932.6	-817.6	3787.1	-3.47	11.54	24.47
10232.0	-18061322	-8766488	-19508841	23925.6	-794.5	3836.0	-3.53	11.55	24.47
10234.0	-18013479	-8768054	-19501120	23918.4	-771.4	3885.0	-3.59	11.55	24.46
10236.0	-17965654	-8769573	-19493302	23911.2	-748.3	3933.9	-3.65	11.56	24.45
10238.0	-17917838	-8771047	-19485386	23905.8	-725.2	3982.8	0.48	11.50	24.46
10240.0	-17870012	-8772475	-19477368	23918.5	-702.3	4034.6	14.40	11.42	27.31
10242.0	-17822148	-8773858	-19469244	23948.1	-679.6	4089.3	15.32	11.33	27.38
10244.0	-17774222	-8775195	-19461011	23982.7	-657.0	4144.1	19.08	11.25	27.44
10246.0	-17726222	-8776487	-19452668	24020.8	-633.6	4199.1	19.08	12.20	27.51
10248.0	-17678147	-8777729	-19444215	24058.9	-608.2	4254.1	19.08	13.14	27.57
10250.0	-17629994	-8778921	-19435652	24097.1	-581.5	4309.3	19.08	13.37	27.64
10252.0	-17581765	-8780060	-19426977	24135.2	-555.2	4364.7	19.08	12.73	27.78
10254.0	-17533460	-8781149	-19418189	24173.4	-530.8	4422.2	19.09	11.65	29.03
10256.0	-17485078	-8782189	-19409287	24211.6	-508.0	4480.2	19.18	11.20	29.02
10258.0	-17436620	-8783184	-19400269	24248.5	-485.5	4538.2	19.29	11.29	29.02
10260.0	-17388084	-8784133	-19391135	24287.1	-462.8	4596.3	19.35	11.38	29.00
10262.0	-17339471	-8785038	-19381885	24325.9	-440.0	4654.3	19.37	11.46	28.99
10264.0	-17290780	-8785896	-19372519	24364.6	-417.0	4712.2	19.40	11.47	28.98
10266.0	-17242012	-8786709	-19363037	24403.5	-394.1	4770.2	19.43	11.46	28.97
10268.0	-17193167	-8787476	-19353439	24442.3	-371.1	4828.1	19.45	11.57	28.96
10270.0	-17144243	-8788196	-19343725	24481.3	-347.8	4886.0	19.49	11.72	28.95

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
10272.0	-17095241	-8788869	-19333895	24520.3	-324.2	4943.9	19.50	11.85	28.94
10274.0	-17046162	-8789495	-19323950	24559.2	-300.4	5001.7	19.45	11.94	28.93
10276.0	-16997004	-8790074	-19313889	24598.1	-276.5	5059.5	19.37	12.02	28.92
10278.0	-16947770	-8790604	-19303712	24636.8	-253.0	5117.3	19.36	12.12	28.91
10280.0	-16898457	-8791085	-19293419	24675.6	-228.7	5175.1	19.46	12.23	28.89
10282.0	-16849067	-8791518	-19283011	24714.6	-204.1	5232.9	19.54	12.36	28.86
10284.0	-16799599	-8791902	-19272488	24753.7	-179.2	5290.6	19.57	12.50	28.83
10286.0	-16750052	-8792235	-19261849	24792.8	-154.1	5348.2	19.54	12.59	28.82
10288.0	-16700427	-8792518	-19251095	24831.9	-128.9	5405.9	19.50	12.63	28.83
10290.0	-16650725	-8792750	-19240225	24870.9	-103.6	5463.5	19.51	12.65	28.85
10292.0	-16600944	-8792932	-19229241	24910.0	-78.2	5521.3	19.54	12.71	28.86
10294.0	-16551085	-8793063	-19218140	24949.0	-52.7	5579.0	19.56	12.82	28.85
10296.0	-16501147	-8793143	-19206925	24988.2	-26.9	5636.6	19.57	12.94	28.82
10298.0	-16451132	-8793171	-19195594	25027.3	-1.0	5694.3	19.58	13.04	28.80
10300.0	-16401038	-8793147	-19184148	25066.5	25.2	5751.9	19.60	13.11	28.79
10302.0	-16350866	-8793070	-19172586	25105.8	51.5	5809.5	19.66	13.18	28.80
10304.0	-16300615	-8792941	-19160910	25145.2	77.9	5867.1	19.72	13.24	28.81
10306.0	-16250285	-8792758	-19149118	25184.7	104.4	5924.7	19.82	13.31	28.83
10308.0	-16199876	-8792523	-19137211	25224.4	131.1	5982.4	19.90	13.38	28.85
10310.0	-16149387	-8792234	-19125189	25264.3	157.9	6040.1	19.97	13.43	28.86
10312.0	-16098819	-8791891	-19113051	25304.3	184.9	6097.8	19.99	13.48	28.87
10314.0	-16048170	-8791494	-19100798	25344.2	211.9	6155.6	19.95	13.51	28.89
10316.0	-15997442	-8791044	-19088429	25384.0	238.9	6213.4	19.89	13.53	28.92
10318.0	-15946634	-8790539	-19075944	25423.8	266.0	6271.2	19.86	13.57	28.92
10320.0	-15895747	-8789980	-19063344	25463.6	293.2	6329.0	19.89	13.67	28.89
10322.0	-15844780	-8789366	-19050628	25503.4	320.7	6386.7	19.95	13.82	28.84
10324.0	-15793733	-8788697	-19037797	25543.3	348.5	6444.4	20.00	13.98	28.80
10326.0	-15742606	-8787971	-19024851	25583.4	376.6	6502.0	20.05	14.09	28.80
10328.0	-15691399	-8787190	-19011789	25623.6	404.8	6559.6	20.10	14.16	28.81
10330.0	-15640112	-8786352	-18998612	25663.8	433.2	6617.2	20.16	14.20	28.82
10332.0	-15588744	-8785457	-18985320	25704.1	461.6	6674.9	20.16	14.25	28.82
10334.0	-15537296	-8784505	-18971913	25744.5	490.2	6732.5	20.21	14.31	28.81
10336.0	-15485766	-8783496	-18958390	25785.0	518.9	6790.1	20.32	14.39	28.83
10338.0	-15434155	-8782430	-18944752	25825.8	547.7	6847.8	20.45	14.46	28.87
10340.0	-15382463	-8781305	-18930999	25866.8	576.7	6905.6	20.56	14.52	28.89
10342.0	-15330688	-8780123	-18917130	25908.0	605.8	6963.4	20.63	14.58	28.90
10344.0	-15278831	-8778882	-18903145	25949.3	635.0	7021.2	20.69	14.62	28.92
10346.0	-15226891	-8777583	-18889045	25990.7	664.3	7079.1	20.72	14.63	28.95
10348.0	-15174868	-8776225	-18874829	26032.1	693.6	7137.0	20.72	14.65	28.96
10350.0	-15122762	-8774808	-18860497	26073.5	722.9	7194.9	20.66	14.70	28.94
10352.0	-15070574	-8773333	-18846049	26114.8	752.4	7252.8	20.64	14.79	28.93
10354.0	-15018303	-8771799	-18831486	26156.2	782.1	7310.6	20.72	14.90	28.92
10356.0	-14965949	-8770204	-18816807	26197.7	812.0	7368.4	20.80	15.04	28.91

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
10358.0	-14913512	-8768550	-18802012	26239.4	842.3	7426.2	20.88	15.20	28.87
10360.0	-14860992	-8766835	-18787102	26281.2	872.8	7483.9	20.95	15.31	28.83
10362.0	-14808387	-8765059	-18772077	26323.1	903.5	7541.6	20.99	15.38	28.83
10364.0	-14755699	-8763221	-18756936	26365.1	934.3	7599.2	20.99	15.41	28.84
10366.0	-14702927	-8761322	-18741680	26407.0	965.2	7656.9	20.93	15.44	28.84
10368.0	-14650071	-8759360	-18726308	26448.9	996.1	7714.6	20.91	15.49	28.84
10370.0	-14597131	-8757337	-18710822	26490.7	1027.2	7772.3	20.98	15.59	28.83
10372.0	-14544108	-8755252	-18695219	26532.8	1058.5	7829.9	21.12	15.73	28.80
10374.0	-14491000	-8753103	-18679502	26575.3	1090.1	7887.5	21.29	15.89	28.77
10376.0	-14437807	-8750891	-18663670	26618.0	1122.0	7945.0	21.42	16.02	28.77
10378.0	-14384528	-8748615	-18647722	26660.9	1154.1	8002.5	21.48	16.10	28.77
10380.0	-14331163	-8746275	-18631659	26703.9	1186.3	8060.1	21.53	16.13	28.79
10382.0	-14277712	-8743870	-18615482	26747.1	1218.6	8117.7	21.62	16.16	28.84
10384.0	-14224175	-8741400	-18599188	26790.3	1251.0	8175.4	21.68	16.19	28.88
10386.0	-14170551	-8738866	-18582780	26833.8	1283.4	8233.2	21.74	16.22	28.90
10388.0	-14116840	-8736266	-18566256	26877.3	1315.9	8291.0	21.78	16.27	28.89
10390.0	-14063041	-8733602	-18549616	26920.9	1348.5	8348.8	21.85	16.36	28.88
10392.0	-14009156	-8730872	-18532860	26964.7	1381.4	8406.5	21.93	16.49	28.87
10394.0	-13955183	-8728076	-18515990	27008.6	1414.4	8464.3	21.97	16.60	28.86
10396.0	-13901121	-8725214	-18499003	27052.5	1447.7	8522.0	21.98	16.68	28.85
10398.0	-13846972	-8722285	-18481902	27096.5	1481.2	8579.7	21.95	16.75	28.82
10400.0	-13792736	-8719289	-18464685	27140.3	1514.7	8637.3	21.93	16.84	28.78
10402.0	-13738411	-8716226	-18447353	27184.3	1548.6	8694.8	21.99	16.98	28.74
10404.0	-13683998	-8713095	-18429905	27228.4	1582.7	8752.3	22.13	17.15	28.72
10406.0	-13629497	-8709895	-18412344	27272.7	1617.1	8809.7	22.24	17.29	28.69
10408.0	-13574907	-8706626	-18394667	27317.3	1651.8	8867.0	22.30	17.41	28.65
10410.0	-13520228	-8703288	-18376876	27361.9	1686.7	8924.3	22.27	17.47	28.65
10412.0	-13465460	-8699879	-18358970	27406.4	1721.7	8981.6	22.26	17.50	28.68
10414.0	-13410603	-8696401	-18340949	27451.0	1756.7	9039.0	22.31	17.55	28.69
10416.0	-13355656	-8692852	-18322814	27495.7	1791.9	9096.3	22.44	17.66	28.66
10418.0	-13300619	-8689233	-18304564	27540.7	1827.4	9153.6	22.53	17.83	28.59
10420.0	-13245493	-8685542	-18286199	27585.8	1863.2	9210.7	22.56	17.97	28.56
10422.0	-13190276	-8681780	-18267721	27631.0	1899.3	9267.9	22.64	18.08	28.57
10424.0	-13134969	-8677945	-18249128	27676.5	1935.5	9325.0	22.79	18.18	28.59
10426.0	-13079570	-8674038	-18230421	27722.2	1972.0	9382.2	22.94	18.28	28.61
10428.0	-13024080	-8670057	-18211599	27768.1	2008.6	9439.4	23.01	18.34	28.59
10430.0	-12968498	-8666003	-18192663	27814.2	2045.3	9496.6	23.02	18.38	28.59
10432.0	-12912823	-8661876	-18173613	27860.2	2082.1	9553.8	23.07	18.42	28.62
10434.0	-12857057	-8657674	-18154448	27906.5	2119.1	9611.1	23.14	18.51	28.64
10436.0	-12801197	-8653399	-18135169	27952.8	2156.2	9668.4	23.22	18.63	28.65
10438.0	-12745245	-8649049	-18115775	27999.3	2193.6	9725.6	23.29	18.74	28.62
10440.0	-12689200	-8644625	-18096266	28046.0	2231.2	9782.8	23.39	18.87	28.59
10442.0	-12633061	-8640124	-18076643	28092.9	2269.1	9840.0	23.54	19.01	28.56

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
10444.0	-12576828	-8635548	-18056906	28140.2	2307.3	9897.1	23.73	19.17	28.59
10446.0	-12520500	-8630895	-18037055	28187.8	2345.7	9954.4	23.83	19.29	28.63
10448.0	-12464077	-8626165	-18017089	28235.4	2384.3	10011.6	23.80	19.34	28.61
10450.0	-12407559	-8621358	-17997008	28282.9	2423.1	10068.7	23.76	19.37	28.55
10452.0	-12350945	-8616473	-17976814	28330.6	2461.9	10125.8	23.85	19.43	28.52
10454.0	-12294236	-8611510	-17956505	28378.4	2500.8	10182.9	24.01	19.55	28.55
10456.0	-12237432	-8606469	-17936082	28426.5	2540.1	10240.0	24.14	19.71	28.58
10458.0	-12180530	-8601350	-17915545	28474.9	2579.7	10297.2	24.20	19.85	28.55
10460.0	-12123532	-8596151	-17894893	28523.4	2619.5	10354.3	24.30	19.98	28.55
10462.0	-12066436	-8590872	-17874128	28572.1	2659.6	10411.4	24.43	20.10	28.58
10464.0	-12009243	-8585512	-17853248	28621.1	2699.9	10468.6	24.51	20.18	28.59
10466.0	-11951952	-8580072	-17832254	28670.1	2740.3	10525.8	24.55	20.27	28.59
10468.0	-11894563	-8574551	-17811145	28719.4	2781.0	10582.9	24.72	20.41	28.59
10470.0	-11837074	-8568948	-17789922	28769.1	2822.0	10640.1	24.95	20.58	28.60
10472.0	-11779486	-8563263	-17768584	28819.1	2863.3	10697.3	25.10	20.73	28.62
10474.0	-11721798	-8557495	-17747132	28869.3	2904.8	10754.6	25.12	20.82	28.65
10476.0	-11664009	-8551643	-17725566	28919.6	2946.5	10812.0	25.16	20.86	28.70
10478.0	-11606119	-8545708	-17703884	28970.1	2988.3	10869.4	25.34	20.92	28.77
10480.0	-11548128	-8539690	-17682088	29021.0	3030.3	10927.0	25.58	21.05	28.80
10482.0	-11490035	-8533587	-17660176	29072.4	3072.5	10984.6	25.77	21.23	28.79
10484.0	-11431838	-8527399	-17638150	29124.1	3115.2	11042.2	25.96	21.43	28.79
10486.0	-11373538	-8521126	-17616008	29176.2	3158.2	11099.8	26.11	21.57	28.83
10488.0	-11315134	-8514767	-17593750	29228.5	3201.4	11157.5	26.25	21.63	28.91
10490.0	-11256624	-8508320	-17571377	29281.1	3244.7	11215.4	26.34	21.67	28.99
10492.0	-11198009	-8501788	-17548888	29333.8	3288.1	11273.5	26.36	21.72	29.03
10494.0	-11139289	-8495168	-17526283	29386.6	3331.6	11331.6	26.38	21.81	29.06
10496.0	-11080463	-8488461	-17503562	29439.4	3375.4	11389.7	26.45	21.98	29.07
10498.0	-11021531	-8481666	-17480725	29492.4	3419.6	11447.8	26.57	22.19	29.05
10500.0	-10962493	-8474783	-17457771	29545.7	3464.2	11505.9	26.75	22.49	29.00
10502.0	-10903348	-8467809	-17434701	29599.4	3509.5	11563.8	26.92	22.79	28.95
10504.0	-10844095	-8460744	-17411516	29653.4	3555.3	11621.7	27.10	23.03	28.95
10506.0	-10784734	-8453587	-17388214	29707.8	3601.5	11679.7	27.31	23.18	29.02
10508.0	-10725264	-8446338	-17364797	29762.6	3648.0	11737.9	27.45	23.26	29.15
10510.0	-10665683	-8438995	-17341263	29817.6	3694.6	11796.3	27.57	23.31	29.29
10512.0	-10605993	-8431560	-17317611	29872.9	3741.2	11855.0	27.69	23.35	29.39
10514.0	-10546192	-8424030	-17293843	29928.5	3788.0	11913.8	27.89	23.44	29.47
10516.0	-10486279	-8416407	-17269956	29984.5	3835.1	11972.9	28.13	23.63	29.57
10518.0	-10426253	-8408690	-17245951	30040.9	3882.5	12032.1	28.27	23.84	29.64
10520.0	-10366115	-8400877	-17221828	30097.5	3930.4	12091.4	28.38	24.03	29.71
10522.0	-10305863	-8392968	-17197585	30154.4	3978.6	12150.9	28.52	24.21	29.77
10524.0	-10245497	-8384962	-17173224	30211.7	4027.3	12210.5	28.69	24.40	29.84
10526.0	-10185016	-8376859	-17148743	30269.2	4076.2	12270.2	28.89	24.57	29.86
10528.0	-10124420	-8368657	-17124143	30327.1	4125.7	12330.0	28.95	24.90	29.99

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
10530.0	-10063708	-8360356	-17099423	30384.9	4176.0	12390.4	28.89	25.41	30.31
10532.0	-10002881	-8351952	-17074581	30442.6	4227.3	12451.3	28.86	25.88	30.61
10534.0	-9941937	-8343446	-17049617	30500.5	4279.2	12512.6	28.98	26.13	30.76
10536.0	-9880878	-8334835	-17024531	30558.7	4331.6	12574.2	29.28	26.19	30.78
10538.0	-9819702	-8326119	-16999321	30617.6	4384.1	12635.8	29.55	26.25	30.81
10540.0	-9758408	-8317299	-16973987	30676.8	4436.7	12697.4	29.73	26.34	30.83
10542.0	-9696995	-8308373	-16948531	30736.4	4489.3	12759.0	29.88	26.35	30.80
10544.0	-9635462	-8299341	-16922951	30796.3	4542.1	12820.6	30.01	26.36	30.80
10546.0	-9573809	-8290204	-16897248	30856.6	4594.8	12882.3	30.26	26.42	30.84
10548.0	-9512035	-8280962	-16871422	30917.4	4647.7	12944.1	30.54	26.49	30.93
10550.0	-9450139	-8271613	-16845472	30978.6	4700.8	13006.1	30.75	26.60	31.11
10552.0	-9388121	-8262159	-16819398	31040.4	4754.1	13068.5	31.05	26.63	31.28
10554.0	-9325978	-8252597	-16793198	31102.8	4807.3	13131.1	31.37	26.63	31.29
S-IVB SECOND GUIDANCE CUTOFF									
10555.510	-9278979	-8245308	-16773335	31150.2	4847.5	13178.3	31.59	26.63	31.29
10556.0	-9263719	-8242932	-16766876	31154.7	4856.6	13190.4	-13.57	10.52	17.90
10558.0	-9201437	-8233199	-16740460	31127.5	4877.7	13226.2	-13.62	10.51	17.85
10560.0	-9139216	-8223425	-16713974	31100.1	4898.7	13261.8	-13.67	10.50	17.79
10562.0	-9077041	-8213606	-16687414	31072.7	4919.7	13297.3	-13.73	10.49	17.73
10564.0	-9014923	-8203747	-16660783	31045.2	4940.6	13332.8	-13.79	10.44	17.67
TRANSLUNAR INJECTION									
10565.510	-8968060	-8196275	-16640631	31024.3	4956.4	13359.4	-13.83	10.42	17.64
10600.0	-7906437	-8019225	-16169591	30531.8	5308.2	13948.8	-14.71	9.99	16.53
10650.0	-6398690	-7741603	-15452186	29769.5	5791.0	14733.2	-15.73	9.31	14.83
10700.0	-4930209	-7440717	-14697707	28963.7	6238.3	15431.3	-16.45	8.58	13.09
10750.0	-3502803	-7118394	-13910511	28128.9	6648.3	16041.9	-16.89	7.82	11.34
10800.0	-2117570	-6776515	-13094951	27279.0	7020.5	16566.4	-17.07	7.07	9.65
10850.0	-774959	-6416962	-12255254	26425.9	7355.5	17008.1	-17.02	6.33	8.04
10900.0	525135	-6041566	-11395446	25579.8	7654.5	17371.7	-16.79	5.63	6.53
10950.0	1783282	-5652076	-10519285	24749.3	7919.6	17663.2	-16.41	4.98	5.15
11000.0	3000431	-5250128	-9630218	23940.9	8153.2	17889.0	-15.91	4.37	3.90
11050.0	4177824	-4837234	-8731371	23159.7	8357.9	18055.6	-15.33	3.82	2.78
11100.0	5316915	-4414776	-7825540	22409.3	8536.3	18169.4	-14.68	3.32	1.79
11150.0	6419305	-3984003	-6915206	21691.9	8690.9	18236.7	-14.01	2.87	0.92
11200.0	7486683	-3546036	-6002549	21009.0	8824.4	18263.2	-13.31	2.47	0.16
11250.0	8520784	-3101875	-5089474	20360.9	8939.1	18254.3	-12.61	2.12	-0.50
11300.0	9523351	-2652405	-4177633	19747.5	9037.1	18214.7	-11.92	1.81	-1.07
11350.0	10496107	-2198411	-3268448	19168.3	9120.4	18148.7	-11.25	1.53	-1.56
11400.0	11440737	-1740581	-2363140	18622.3	9190.8	18060.2	-10.60	1.29	-1.97

TABLE C-V. EARTH-FIXED LAUNCH SITE POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	DDXE FT/S SQ	DDYE FT/S SQ	DDZE FT/S SQ
11450.0	12358870	-1279518	-1462750	18108.3	9249.9	17952.5	-9.97	1.08	-2.33
11500.0	13252074	-815753	-568162	17624.9	9299.1	17828.6	-9.37	0.89	-2.62
11550.0	14121844	-349747	319879	17170.7	9339.7	17691.0	-8.80	0.73	-2.87
11600.0	14969604	118096	1200749	16744.2	9372.8	17542.1	-8.26	0.59	-3.08
11650.0	15796703	587426	2073928	16344.0	9399.4	17383.7	-7.75	0.47	-3.25
11700.0	16604415	1057939	2938986	15968.5	9420.2	17217.5	-7.27	0.37	-3.39
11750.0	17393941	1529367	3795571	15616.3	9436.1	17045.0	-6.82	0.27	-3.51
11800.0	18166414	2001482	4643397	15286.1	9447.8	16867.3	-6.39	0.19	-3.60
11850.0	18922894	2474083	5482237	14976.5	9455.7	16685.7	-6.00	0.12	-3.67
11900.0	19664381	2946996	6311911	14686.1	9460.4	16500.8	-5.62	0.06	-3.72
11950.0	20391808	3420071	7132280	14413.9	9462.2	16313.6	-5.27	0.01	-3.76
12000.0	21106052	3893176	7943240	14158.6	9461.6	16124.6	-4.94	-0.03	-3.79
12050.0	21807932	4366198	8744719	13919.2	9458.9	15934.4	-4.64	-0.07	-3.81
SPACECRAFT SEPARATION SEQUENCE START									
12056.300	21895531	4425787	8845030	13890.1	9458.4	15910.4	-4.60	-0.08	-3.81
S-IVB/CSM PHYSICAL SEPARATION									
12059.300	21937181	4454162	8892744	13876.4	9458.2	15898.9	-4.58	-0.08	-3.81

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
INITIATE S-IVB RESTART SEQUENCE									
9659.540	2810.745	2045.752	-713.346	-10815.2	19335.8	12751.2	-24.01	-17.47	6.11
9660.0	2809.925	2047.215	-712.380	-10826.2	19327.8	12754.0	-24.00	-17.48	6.10
9670.0	2791.911	2078.880	-691.340	-11065.5	19151.6	12814.1	-23.85	-17.76	5.92
9680.0	2773.503	2110.253	-670.203	-11303.2	18972.7	12872.4	-23.69	-18.02	5.74
9690.0	2754.706	2141.329	-648.971	-11539.2	18791.1	12928.9	-23.53	-18.29	5.56
9700.0	2735.522	2172.104	-627.647	-11773.7	18606.9	12983.6	-23.36	-18.55	5.38
9710.0	2715.953	2202.573	-606.235	-12006.5	18420.1	13036.5	-23.20	-18.81	5.20
9720.0	2696.003	2232.733	-584.737	-12237.7	18230.7	13087.5	-23.03	-19.07	5.01
9730.0	2675.673	2262.580	-563.157	-12467.1	18038.8	13136.7	-22.85	-19.32	4.83
9740.0	2654.967	2292.108	-541.498	-12694.7	17844.3	13184.0	-22.68	-19.57	4.64
9750.0	2633.888	2321.314	-519.762	-12920.6	17647.3	13229.5	-22.50	-19.82	4.45
9760.0	2612.439	2350.194	-497.953	-13144.6	17447.8	13273.1	-22.31	-20.07	4.27
9770.0	2590.623	2378.743	-476.074	-13366.8	17245.9	13314.8	-22.13	-20.31	4.08
9780.0	2568.442	2406.959	-454.127	-13587.1	17041.5	13354.7	-21.94	-20.55	3.89
9790.0	2545.901	2434.836	-432.117	-13805.5	16834.8	13392.7	-21.74	-20.79	3.70
9800.0	2523.002	2462.370	-410.045	-14022.0	16625.7	13428.7	-21.55	-21.03	3.51
9810.0	2499.748	2489.559	-387.916	-14236.5	16414.2	13462.9	-21.35	-21.26	3.32
9820.0	2476.142	2516.398	-365.732	-14449.0	16200.5	13495.2	-21.15	-21.49	3.13
9830.0	2452.189	2542.883	-343.496	-14659.4	15984.5	13525.6	-20.94	-21.71	2.94
9840.0	2427.891	2569.011	-321.212	-14867.8	15766.2	13554.1	-20.74	-21.94	2.75
9850.0	2403.251	2594.777	-298.883	-15074.1	15545.8	13580.7	-20.52	-22.16	2.56
9860.0	2378.274	2620.180	-276.512	-15278.3	15323.1	13605.3	-20.31	-22.37	2.37
9870.0	2352.963	2645.213	-254.101	-15480.3	15098.3	13628.1	-20.09	-22.59	2.18
9880.0	2327.321	2669.876	-231.655	-15680.2	14871.4	13648.9	-19.88	-22.80	1.99
9890.0	2301.351	2694.163	-209.176	-15877.8	14642.4	13667.8	-19.65	-23.00	1.79
9900.0	2275.059	2718.071	-186.667	-16073.3	14411.3	13684.8	-19.43	-23.21	1.60
9910.0	2248.446	2741.597	-164.132	-16266.4	14178.2	13699.8	-19.20	-23.41	1.41
9920.0	2221.518	2764.739	-141.574	-16457.3	13943.1	13712.9	-18.97	-23.61	1.21
9930.0	2194.277	2787.491	-118.996	-16645.8	13706.1	13724.1	-18.74	-23.80	1.02
9940.0	2166.728	2809.852	-96.402	-16832.1	13467.2	13733.3	-18.50	-23.99	0.83
9950.0	2138.874	2831.818	-73.793	-17015.9	13226.3	13740.6	-18.27	-24.18	0.63
9960.0	2110.720	2853.387	-51.174	-17197.4	12983.6	13746.0	-18.02	-24.36	0.44
9970.0	2082.269	2874.554	-28.548	-17376.4	12739.1	13749.5	-17.78	-24.54	0.25
9980.0	2053.526	2895.317	-5.918	-17553.0	12492.8	13750.9	-17.54	-24.72	0.05
9990.0	2024.494	2915.674	16.713	-17727.1	12244.7	13750.5	-17.29	-24.89	-0.14
10000.0	1995.177	2935.621	39.342	-17898.7	11995.0	13748.1	-17.04	-25.06	-0.33
10010.0	1965.580	2955.155	61.965	-18067.8	11743.5	13743.8	-16.78	-25.23	-0.53
10020.0	1935.707	2974.275	84.580	-18234.4	11490.4	13737.6	-16.53	-25.39	-0.72
10030.0	1905.562	2992.976	107.182	-18398.4	11235.7	13729.4	-16.27	-25.55	-0.92
10040.0	1875.148	3011.257	129.770	-18559.8	10979.4	13719.2	-16.01	-25.71	-1.11

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
10050.0	1844.472	3029.115	152.339	-18718.6	10721.6	13707.2	-15.75	-25.86	-1.30
10060.0	1813.536	3046.547	174.887	-18874.8	10462.3	13693.2	-15.48	-26.01	-1.50
10070.0	1782.346	3063.552	197.410	-19028.3	10201.5	13677.3	-15.22	-26.15	-1.69
10080.0	1750.904	3080.125	219.906	-19179.1	9939.3	13659.4	-14.95	-26.29	-1.88
10090.0	1719.217	3096.267	242.370	-19327.3	9675.7	13639.7	-14.68	-26.43	-2.07
10100.0	1687.289	3111.973	264.801	-19472.7	9410.7	13618.0	-14.41	-26.56	-2.27
10110.0	1655.123	3127.242	287.194	-19615.4	9144.4	13594.3	-14.13	-26.69	-2.46
10120.0	1622.725	3142.072	309.546	-19755.3	8876.9	13568.8	-13.85	-26.82	-2.65
10130.0	1590.098	3156.460	331.855	-19892.5	8608.1	13541.4	-13.58	-26.94	-2.84
10140.0	1557.249	3170.405	354.118	-20026.8	8338.1	13512.0	-13.29	-27.06	-3.03
10150.0	1524.180	3183.905	376.330	-20158.4	8066.9	13480.8	-13.01	-27.17	-3.22
10160.0	1490.897	3196.958	398.490	-20287.1	7794.6	13447.6	-12.73	-27.28	-3.41
10170.0	1457.405	3209.561	420.593	-20412.9	7521.2	13412.6	-12.44	-27.39	-3.60
10180.0	1423.708	3221.714	442.637	-20535.9	7246.8	13375.7	-12.16	-27.49	-3.79
10190.0	1389.811	3233.414	464.619	-20656.1	6971.4	13336.9	-11.87	-27.59	-3.97
10200.0	1355.719	3244.660	486.536	-20773.3	6695.0	13296.2	-11.58	-27.69	-4.16
10210.0	1321.436	3255.450	508.384	-20887.6	6417.6	13253.7	-11.29	-27.78	-4.35
10220.0	1286.967	3265.784	530.160	-20999.0	6139.4	13209.3	-10.99	-27.87	-4.53
S-IVB RESTART COMMAND									
10229.510	1254.020	3275.185	550.801	-21102.3	5874.0	13165.4	-10.73	-27.95	-4.70
10230.0	1252.318	3275.658	551.862	-21107.6	5860.2	13163.1	-10.71	-27.95	-4.71
10232.0	1245.366	3277.578	556.194	-21128.9	5804.3	13153.7	-10.66	-27.97	-4.74
10234.0	1238.408	3279.479	560.521	-21150.2	5748.3	13144.1	-10.60	-27.99	-4.78
10236.0	1231.444	3281.362	564.846	-21171.3	5692.3	13134.5	-10.55	-28.01	-4.81
10238.0	1224.471	3283.227	569.168	-21193.8	5637.0	13125.8	-13.80	-26.51	-2.79
10240.0	1217.489	3285.074	573.489	-21231.6	5585.6	13126.8	-25.61	-24.08	4.72
10242.0	1210.492	3286.904	577.811	-21283.4	5537.7	13136.7	-26.30	-23.81	5.24
10244.0	1203.478	3288.719	582.137	-21339.1	5491.4	13149.1	-29.27	-22.50	7.13
10246.0	1196.445	3290.519	586.467	-21398.1	5446.2	13162.6	-29.79	-22.66	6.36
10248.0	1189.393	3292.304	590.801	-21458.2	5400.8	13174.5	-30.31	-22.82	5.59
10250.0	1182.320	3294.074	595.140	-21519.0	5355.0	13185.4	-30.44	-22.91	5.41
10252.0	1175.228	3295.829	599.482	-21579.7	5309.1	13196.5	-30.12	-22.99	5.99
10254.0	1168.115	3297.568	603.828	-21639.8	5261.4	13209.9	-29.86	-24.07	7.23
10256.0	1160.983	3299.292	608.178	-21699.3	5213.4	13224.8	-29.68	-24.01	7.64
10258.0	1153.831	3301.000	612.534	-21757.6	5164.8	13239.3	-29.80	-23.98	7.62
10260.0	1146.660	3302.692	616.894	-21817.3	5116.9	13254.5	-29.89	-23.97	7.57
10262.0	1139.469	3304.369	621.260	-21877.1	5068.9	13269.6	-29.94	-23.97	7.51
10264.0	1132.258	3306.030	625.630	-21937.0	5021.0	13284.6	-29.95	-23.96	7.52
10266.0	1125.028	3307.674	630.005	-21996.9	4973.1	13299.7	-29.95	-23.96	7.54
10268.0	1117.778	3309.303	634.386	-22056.9	4925.2	13314.7	-30.03	-23.96	7.45
10270.0	1110.508	3310.917	638.771	-22117.0	4877.3	13329.5	-30.12	-23.96	7.34

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
10272.0	1103.218	3312.514	643.161	-22177.3	4829.3	13344.0	-30.19	-23.97	7.24
10274.0	1095.908	3314.096	647.556	-22237.7	4781.5	13358.4	-30.19	-24.00	7.13
10276.0	1088.579	3315.662	651.955	-22298.0	4733.5	13372.5	-30.15	-24.04	7.02
10278.0	1081.229	3317.212	656.360	-22358.0	4685.4	13387.0	-30.19	-24.06	6.94
10280.0	1073.860	3318.747	660.768	-22418.5	4637.3	13400.9	-30.30	-24.03	6.89
10282.0	1066.471	3320.265	665.182	-22479.2	4589.3	13414.6	-30.43	-23.99	6.81
10284.0	1059.062	3321.768	669.599	-22540.1	4541.3	13428.1	-30.51	-23.98	6.70
10286.0	1051.632	3323.255	674.021	-22601.2	4493.3	13441.4	-30.52	-24.01	6.60
10288.0	1044.183	3324.726	678.448	-22662.2	4445.3	13454.5	-30.51	-24.05	6.55
10290.0	1036.713	3326.181	682.879	-22723.2	4397.2	13467.6	-30.52	-24.07	6.54
10292.0	1029.224	3327.621	687.314	-22784.3	4349.0	13480.6	-30.57	-24.09	6.51
10294.0	1021.714	3329.044	691.753	-22845.5	4300.8	13493.6	-30.63	-24.10	6.43
10296.0	1014.184	3330.452	696.197	-22906.8	4252.6	13506.4	-30.69	-24.10	6.33
10298.0	1006.634	3331.844	700.645	-22968.3	4204.4	13518.9	-30.73	-24.10	6.24
10300.0	999.064	3333.220	705.097	-23029.8	4156.2	13531.4	-30.78	-24.10	6.19
10302.0	991.473	3334.580	709.553	-23091.4	4108.0	13543.7	-30.85	-24.10	6.16
10304.0	983.863	3335.924	714.013	-23153.2	4059.8	13556.0	-30.93	-24.11	6.15
10306.0	976.231	3337.252	718.477	-23215.1	4011.6	13568.3	-31.03	-24.11	6.14
10308.0	968.580	3338.565	722.945	-23277.3	3963.4	13580.6	-31.14	-24.12	6.12
10310.0	960.907	3339.862	727.417	-23339.7	3915.1	13592.8	-31.21	-24.12	6.11
10312.0	953.215	3341.142	731.893	-23402.1	3866.8	13605.0	-31.25	-24.14	6.09
10314.0	945.501	3342.407	736.373	-23464.6	3818.5	13617.1	-31.23	-24.19	6.05
10316.0	937.768	3343.656	740.858	-23527.0	3770.1	13629.2	-31.19	-24.26	6.02
10318.0	930.013	3344.889	745.346	-23589.4	3721.5	13641.2	-31.18	-24.29	5.97
10320.0	922.238	3346.106	749.838	-23651.8	3673.0	13653.0	-31.24	-24.27	5.89
10322.0	914.443	3347.307	754.334	-23714.4	3624.5	13664.7	-31.35	-24.23	5.78
10324.0	906.627	3348.492	758.833	-23777.2	3576.0	13676.1	-31.45	-24.21	5.66
10326.0	898.790	3349.661	763.337	-23840.2	3527.6	13687.4	-31.54	-24.21	5.59
10328.0	890.933	3350.814	767.844	-23903.3	3479.2	13698.5	-31.61	-24.23	5.56
10330.0	883.054	3351.952	772.355	-23966.6	3430.7	13709.7	-31.67	-24.23	5.55
10332.0	875.155	3353.073	776.869	-24029.9	3382.2	13720.7	-31.69	-24.24	5.52
10334.0	867.235	3354.178	781.387	-24093.4	3333.8	13731.7	-31.75	-24.24	5.49
10336.0	859.294	3355.268	785.909	-24157.0	3285.3	13742.7	-31.87	-24.24	5.47
10338.0	851.332	3356.341	790.434	-24220.9	3236.8	13753.6	-32.02	-24.25	5.49
10340.0	843.349	3357.398	794.963	-24285.0	3188.3	13764.6	-32.13	-24.25	5.50
10342.0	835.345	3358.440	799.496	-24349.4	3139.8	13775.6	-32.21	-24.25	5.48
10344.0	827.319	3359.465	804.032	-24413.9	3091.3	13786.6	-32.28	-24.27	5.49
10346.0	819.273	3360.475	808.572	-24478.5	3042.7	13797.6	-32.31	-24.30	5.50
10348.0	811.205	3361.468	813.115	-24543.1	2994.1	13808.5	-32.31	-24.33	5.48
10350.0	803.116	3362.446	817.662	-24607.7	2945.4	13819.4	-32.28	-24.35	5.40
10352.0	795.005	3363.407	822.213	-24672.2	2896.7	13830.1	-32.29	-24.36	5.32
10354.0	786.873	3364.353	826.767	-24737.0	2848.0	13840.7	-32.41	-24.36	5.26
10356.0	778.720	3365.282	831.324	-24801.9	2799.3	13851.2	-32.54	-24.34	5.18

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
10358.0	770.546	3366.196	835.885	-24867.1	2750.6	13861.4	-32.66	-24.30	5.08
10360.0	762.350	3367.093	840.449	-24932.5	2702.1	13871.5	-32.76	-24.27	5.00
10362.0	754.132	3367.974	845.017	-24998.1	2653.5	13881.5	-32.82	-24.27	4.97
10364.0	745.893	3368.840	849.588	-25063.7	2605.0	13891.4	-32.83	-24.30	4.94
10366.0	737.633	3369.689	854.162	-25129.4	2556.3	13901.2	-32.79	-24.34	4.90
10368.0	729.350	3370.523	858.739	-25194.9	2507.6	13911.0	-32.78	-24.37	4.84
10370.0	721.046	3371.340	863.320	-25260.6	2458.9	13920.6	-32.88	-24.36	4.79
10372.0	712.721	3372.141	867.903	-25326.5	2410.2	13930.1	-33.06	-24.31	4.73
10374.0	704.373	3372.927	872.490	-25392.9	2361.7	13939.5	-33.27	-24.25	4.68
10376.0	696.004	3373.696	877.080	-25459.6	2313.2	13948.8	-33.43	-24.22	4.62
10378.0	687.613	3374.450	881.673	-25526.5	2264.7	13958.0	-33.51	-24.23	4.59
10380.0	679.200	3375.187	886.269	-25593.6	2216.3	13967.2	-33.56	-24.25	4.59
10382.0	670.764	3375.909	890.868	-25660.8	2167.7	13976.4	-33.65	-24.28	4.62
10384.0	662.307	3376.614	895.470	-25728.2	2119.2	13985.7	-33.72	-24.31	4.64
10386.0	653.827	3377.304	900.075	-25795.7	2070.5	13995.0	-33.78	-24.33	4.64
10388.0	645.325	3377.977	904.683	-25863.3	2021.9	14004.2	-33.82	-24.33	4.62
10390.0	636.801	3378.635	909.294	-25931.0	1973.2	14013.4	-33.92	-24.31	4.57
10392.0	628.254	3379.276	913.908	-25999.0	1924.6	14022.5	-34.04	-24.30	4.50
10394.0	619.685	3379.902	918.525	-26067.1	1876.0	14031.4	-34.12	-24.30	4.43
10396.0	611.094	3380.511	923.145	-26135.4	1827.4	14040.2	-34.15	-24.31	4.36
10398.0	602.480	3381.105	927.768	-26203.7	1778.8	14048.9	-34.15	-24.32	4.28
10400.0	593.844	3381.682	932.394	-26272.0	1730.1	14057.3	-34.17	-24.31	4.18
10402.0	585.185	3382.244	937.022	-26340.4	1681.5	14065.6	-34.27	-24.28	4.09
10404.0	576.503	3382.789	941.653	-26409.2	1633.0	14073.7	-34.45	-24.25	4.01
10406.0	567.799	3383.319	946.287	-26478.2	1584.6	14081.6	-34.61	-24.20	3.93
10408.0	559.072	3383.832	950.923	-26547.5	1536.2	14089.4	-34.70	-24.17	3.85
10410.0	550.323	3384.330	955.562	-26616.9	1487.8	14097.1	-34.70	-24.20	3.79
10412.0	541.550	3384.812	960.204	-26686.3	1439.4	14104.6	-34.71	-24.25	3.77
10414.0	532.754	3385.278	964.847	-26755.8	1390.9	14112.2	-34.77	-24.27	3.76
10416.0	523.936	3385.727	969.494	-26825.5	1342.4	14119.6	-34.91	-24.21	3.71
10418.0	515.095	3386.161	974.143	-26895.4	1294.0	14126.9	-35.05	-24.15	3.60
10420.0	506.230	3386.579	978.794	-26965.6	1245.7	14134.0	-35.13	-24.14	3.48
10422.0	497.343	3386.981	983.447	-27036.0	1197.4	14140.9	-35.25	-24.15	3.43
10424.0	488.432	3387.368	988.103	-27106.7	1149.2	14147.8	-35.42	-24.14	3.43
10426.0	479.498	3387.738	992.761	-27177.7	1100.9	14154.6	-35.59	-24.13	3.42
10428.0	470.541	3388.092	997.421	-27248.9	1052.7	14161.4	-35.66	-24.11	3.39
10430.0	461.560	3388.431	1002.084	-27320.3	1004.4	14168.2	-35.68	-24.13	3.37
10432.0	452.555	3388.754	1006.748	-27391.7	956.1	14175.0	-35.74	-24.15	3.36
10434.0	443.527	3389.060	1011.415	-27463.3	907.8	14181.6	-35.84	-24.18	3.33
10436.0	434.476	3389.351	1016.084	-27535.1	859.4	14188.2	-35.96	-24.18	3.28
10438.0	425.401	3389.626	1020.756	-27607.1	811.1	14194.7	-36.06	-24.15	3.21
10440.0	416.302	3389.885	1025.429	-27679.4	762.8	14201.1	-36.19	-24.12	3.14
10442.0	407.179	3390.128	1030.104	-27751.9	714.7	14207.3	-36.37	-24.07	3.08

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
10444.0	398.032	3390.356	1034.782	-27824.9	666.5	14213.4	-36.61	-24.06	3.05
10446.0	388.861	3390.567	1039.461	-27898.3	618.4	14219.5	-36.75	-24.10	3.01
10448.0	379.666	3390.763	1044.143	-27971.7	570.2	14225.4	-36.74	-24.11	2.94
10450.0	370.447	3390.942	1048.826	-28045.2	522.0	14231.3	-36.70	-24.08	2.88
10452.0	361.204	3391.106	1053.511	-28118.7	473.8	14237.0	-36.80	-24.04	2.87
10454.0	351.936	3391.254	1058.198	-28192.5	425.7	14242.8	-36.99	-24.04	2.86
10456.0	342.644	3391.387	1062.888	-28266.6	377.7	14248.4	-37.17	-24.06	2.79
10458.0	333.328	3391.503	1067.578	-28341.1	329.6	14253.9	-37.28	-24.04	2.69
10460.0	323.987	3391.604	1072.271	-28415.8	281.5	14259.2	-37.42	-24.04	2.63
10462.0	314.621	3391.688	1076.965	-28490.8	233.4	14264.5	-37.59	-24.04	2.61
10464.0	305.231	3391.757	1081.662	-28566.1	185.3	14269.6	-37.69	-24.05	2.58
10466.0	295.815	3391.810	1086.359	-28641.5	137.2	14274.7	-37.76	-24.06	2.52
10468.0	286.375	3391.847	1091.059	-28717.3	89.1	14279.8	-37.96	-24.03	2.49
10470.0	276.910	3391.869	1095.760	-28793.5	41.1	14284.7	-38.23	-23.99	2.46
10472.0	267.420	3391.875	1100.463	-28870.1	-6.9	14289.6	-38.42	-23.99	2.41
10474.0	257.905	3391.864	1105.167	-28947.0	-54.9	14294.3	-38.49	-24.03	2.36
10476.0	248.364	3391.838	1109.873	-29024.0	-103.1	14299.0	-38.54	-24.09	2.35
10478.0	238.798	3391.797	1114.580	-29101.3	-151.3	14303.8	-38.73	-24.11	2.41
10480.0	229.206	3391.739	1119.289	-29179.0	-199.5	14308.6	-38.99	-24.09	2.42
10482.0	219.589	3391.665	1124.000	-29257.3	-247.6	14313.4	-39.24	-24.05	2.36
10484.0	209.946	3391.576	1128.712	-29336.0	-295.7	14318.0	-39.48	-24.02	2.28
10486.0	200.276	3391.471	1133.426	-29415.1	-343.7	14322.6	-39.68	-24.03	2.25
10488.0	190.581	3391.350	1138.141	-29494.6	-391.8	14327.1	-39.83	-24.09	2.29
10490.0	180.860	3391.213	1142.857	-29574.4	-440.1	14331.7	-39.94	-24.15	2.32
10492.0	171.112	3391.060	1147.576	-29654.3	-488.4	14336.4	-39.98	-24.20	2.30
10494.0	161.338	3390.891	1152.295	-29734.4	-536.9	14340.9	-40.05	-24.25	2.24
10496.0	151.537	3390.706	1157.016	-29814.6	-585.4	14345.3	-40.18	-24.27	2.13
10498.0	141.710	3390.506	1161.739	-29895.2	-633.9	14349.4	-40.38	-24.24	2.01
10500.0	131.857	3390.289	1166.463	-29976.2	-682.3	14353.3	-40.67	-24.18	1.83
10502.0	121.976	3390.057	1171.188	-30057.8	-730.6	14356.7	-40.94	-24.13	1.65
10504.0	112.069	3389.808	1175.914	-30140.0	-778.9	14359.9	-41.21	-24.10	1.54
10506.0	102.135	3389.544	1180.641	-30222.6	-827.1	14363.0	-41.46	-24.13	1.53
10508.0	92.173	3389.264	1185.369	-30305.7	-875.5	14366.1	-41.64	-24.23	1.57
10510.0	82.184	3388.967	1190.099	-30389.2	-924.0	14369.3	-41.79	-24.34	1.62
10512.0	72.167	3388.655	1194.829	-30472.9	-972.8	14372.6	-41.93	-24.41	1.67
10514.0	62.123	3388.327	1199.560	-30557.0	-1021.6	14376.0	-42.15	-24.45	1.71
10516.0	52.051	3387.983	1204.293	-30641.6	-1070.6	14379.4	-42.45	-24.49	1.70
10518.0	41.951	3387.622	1209.026	-30726.7	-1119.6	14382.7	-42.68	-24.55	1.60
10520.0	31.823	3387.246	1213.761	-30812.3	-1168.8	14385.8	-42.89	-24.61	1.52
10522.0	21.667	3386.853	1218.497	-30898.3	-1218.1	14388.8	-43.10	-24.66	1.45
10524.0	11.482	3386.444	1223.234	-30984.7	-1267.4	14391.6	-43.35	-24.70	1.39
10526.0	1.269	3386.018	1227.971	-31071.6	-1316.7	14394.4	-43.59	-24.69	1.35
10528.0	-8.973	3385.577	1232.710	-31159.1	-1366.3	14396.8	-43.84	-24.85	1.14

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
10530.0	-19.243	3385.119	1237.449	-31247.1	-1416.4	14398.7	-44.14	-25.23	0.77
10532.0	-29.543	3384.644	1242.188	-31335.6	-1467.2	14400.0	-44.43	-25.59	0.44
10534.0	-39.872	3384.153	1246.928	-31424.7	-1518.5	14400.8	-44.69	-25.73	0.34
10536.0	-50.231	3383.645	1251.669	-31514.4	-1569.9	14401.5	-44.96	-25.68	0.43
10538.0	-60.619	3383.119	1256.409	-31604.6	-1621.3	14402.4	-45.20	-25.63	0.51
10540.0	-71.036	3382.577	1261.150	-31695.2	-1672.5	14403.5	-45.40	-25.62	0.54
10542.0	-81.484	3382.018	1265.891	-31786.0	-1723.7	14404.6	-45.50	-25.56	0.59
10544.0	-91.962	3381.443	1270.633	-31877.2	-1774.8	14405.8	-45.61	-25.53	0.64
10546.0	-102.469	3380.850	1275.375	-31968.6	-1825.9	14407.2	-45.84	-25.51	0.73
10548.0	-113.007	3380.241	1280.117	-32060.5	-1876.9	14408.8	-46.12	-25.53	0.82
10550.0	-123.575	3379.615	1284.860	-32153.0	-1928.1	14410.5	-46.37	-25.65	0.88
10552.0	-134.174	3378.971	1289.604	-32246.0	-1979.5	14412.3	-46.66	-25.73	1.05
10554.0	-144.803	3378.311	1294.348	-32339.5	-2030.9	14414.6	-46.91	-25.65	1.21
S-IVB SECOND GUIDANCE CUTOFF									
10555.510	-152.849	3377.802	1297.930	-32410.4	-2069.5	14416.5	-47.08	-25.59	1.31
10556.0	-155.462	3377.634	1299.093	-32421.7	-2082.5	14414.2	1.26	-27.09	-10.46
10558.0	-166.133	3376.940	1303.834	-32419.0	-2136.6	14393.3	1.34	-27.06	-10.50
10560.0	-176.802	3376.228	1308.568	-32416.3	-2190.7	14372.2	1.41	-27.02	-10.53
10562.0	-187.473	3375.498	1313.295	-32413.4	-2244.7	14351.1	1.48	-26.98	-10.56
10564.0	-198.141	3374.750	1318.016	-32410.3	-2298.7	14330.0	1.59	-26.94	-10.56
TRANSLUNAR INJECTION									
10565.510	-206.195	3374.174	1321.575	-32407.9	-2339.3	14314.0	1.64	-26.92	-10.57
10600.0	-389.945	3358.285	1401.780	-32326.8	-3254.4	13943.1	3.03	-26.13	-10.94
10650.0	-655.206	3326.218	1514.238	-32128.0	-4528.1	13386.1	4.88	-24.78	-11.31
10700.0	-918.466	3283.960	1622.047	-31842.4	-5729.7	12814.6	6.50	-23.26	-11.52
10750.0	-1179.058	3232.138	1725.122	-31481.7	-6851.8	12236.9	7.88	-21.62	-11.57
10800.0	-1436.415	3171.423	1823.442	-31058.1	-7890.3	11660.2	9.02	-19.92	-11.48
10850.0	-1690.070	3102.514	1917.044	-30583.8	-8843.5	11090.9	9.92	-18.21	-11.28
10900.0	-1939.651	3026.110	2006.009	-30069.9	-9712.1	10533.9	10.60	-16.54	-10.99
10950.0	-2184.877	2942.899	2090.456	-29527.0	-10498.6	9993.3	11.09	-14.93	-10.63
11000.0	-2425.548	2853.541	2170.531	-28964.2	-11206.8	9471.9	11.40	-13.41	-10.22
11050.0	-2661.534	2758.661	2246.401	-28389.5	-11841.4	8971.7	11.57	-11.99	-9.78
11100.0	-2892.765	2658.844	2318.248	-27809.6	-12407.6	8494.1	11.61	-10.68	-9.32
11150.0	-3119.221	2554.630	2386.259	-27229.8	-12910.9	8039.5	11.56	-9.47	-8.86
11200.0	-3340.923	2446.516	2450.625	-26654.8	-13356.5	7608.1	11.43	-8.37	-8.40
11250.0	-3557.924	2334.953	2511.535	-26087.8	-13749.8	7199.6	11.24	-7.38	-7.95
11300.0	-3770.303	2220.352	2569.175	-25531.7	-14095.9	6813.3	11.00	-6.48	-7.51
11350.0	-3978.157	2103.082	2623.727	-24988.3	-14399.3	6448.6	10.73	-5.67	-7.09
11400.0	-4181.596	1983.476	2675.362	-24459.1	-14664.4	6104.4	10.43	-4.95	-6.68

TABLE C-VI. GEOCENTRIC INERTIAL POSITIONS, VELOCITIES AND ACCELERATIONS - SECOND BURN PHASE

TIME SEC	XSP NM	YSP NM	ZSP NM	DXSP FT/S	DYSP FT/S	DZSP FT/S	DDXSP FT/S SQ	DDYSP FT/S SQ	DDZSP FT/S SQ
11450.0	-4380.743	1861.830	2724.247	-23945.0	-14895.3	5779.9	10.12	-4.30	-6.30
11500.0	-4575.724	1738.414	2770.538	-23446.8	-15095.6	5473.9	9.80	-3.72	-5.94
11550.0	-4766.672	1613.464	2814.384	-22964.7	-15268.5	5185.5	9.48	-3.20	-5.60
11600.0	-4953.719	1487.194	2855.925	-22498.8	-15416.9	4913.5	9.16	-2.74	-5.28
11650.0	-5136.998	1359.794	2895.292	-22049.0	-15543.6	4657.0	8.84	-2.33	-4.98
11700.0	-5316.642	1231.433	2932.609	-21615.0	-15650.9	4415.0	8.52	-1.97	-4.70
11750.0	-5492.779	1102.261	2967.990	-21196.7	-15740.9	4186.6	8.21	-1.64	-4.44
11800.0	-5665.536	972.413	3001.545	-20793.5	-15815.5	3970.9	7.92	-1.35	-4.19
11850.0	-5835.035	842.009	3033.375	-20404.9	-15876.4	3767.0	7.63	-1.09	-3.96
11900.0	-6001.396	711.155	3063.573	-20030.6	-15925.0	3574.3	7.35	-0.86	-3.75
11950.0	-6164.733	579.948	3092.229	-19669.8	-15962.6	3391.9	7.08	-0.65	-3.55
12000.0	-6325.156	448.472	3119.424	-19322.1	-15990.4	3219.3	6.83	-0.47	-3.36
12050.0	-6482.769	316.803	3145.236	-18987.0	-16009.6	3055.6	6.58	-0.30	-3.19
SPACECRAFT SEPARATION SEQUENCE START									
12056.300	-6502.434	300.203	3148.393	-18945.7	-16011.4	3035.6	6.55	-0.28	-3.16
S-IVB/CSM PHYSICAL SEPARATION									
12059.300	-6511.784	292.297	3149.890	-18926.1	-16012.3	3026.2	6.53	-0.27	-3.15

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
INITIATE S-IVB RESTART SEQUENCE										
9659.540	3548.838	162.4124	-11.5937	57.52	0.04	24249.5	59.38	0.04	25562.3	640253
9660.0	3548.839	162.4379	-11.5778	57.52	0.04	24249.5	59.37	0.04	25562.3	640254
9670.0	3548.867	162.9920	-11.2312	57.39	0.04	24249.5	59.26	0.04	25562.2	640261
9680.0	3548.895	163.5446	-10.8835	57.27	0.04	24249.5	59.14	0.04	25562.1	640271
9690.0	3548.924	164.0959	-10.5346	57.15	0.04	24249.5	59.03	0.04	25562.0	640285
9700.0	3548.951	164.6458	-10.1846	57.04	0.04	24249.5	58.92	0.04	25561.9	640302
9710.0	3548.979	165.1944	-9.8335	56.92	0.04	24249.6	58.82	0.04	25561.8	640321
9720.0	3549.006	165.7418	-9.4815	56.82	0.04	24249.6	58.72	0.04	25561.7	640344
9730.0	3549.033	166.2879	-9.1284	56.72	0.04	24249.5	58.63	0.04	25561.6	640371
9740.0	3549.060	166.8328	-8.7745	56.62	0.04	24249.5	58.53	0.04	25561.5	640401
9750.0	3549.087	167.3766	-8.4196	56.52	0.04	24249.5	58.45	0.04	25561.4	640434
9760.0	3549.114	167.9194	-8.0638	56.43	0.04	24249.5	58.36	0.04	25561.3	640470
9770.0	3549.140	168.4611	-7.7072	56.35	0.04	24249.5	58.28	0.04	25561.2	640510
9780.0	3549.166	169.0018	-7.3499	56.26	0.04	24249.5	58.21	0.04	25561.1	640554
9790.0	3549.192	169.5415	-6.9918	56.19	0.04	24249.4	58.13	0.03	25561.0	640601
9800.0	3549.217	170.0804	-6.6329	56.11	0.04	24249.4	58.06	0.03	25560.9	640652
9810.0	3549.242	170.6184	-6.2735	56.04	0.04	24249.3	58.00	0.03	25560.8	640707
9820.0	3549.267	171.1556	-5.9133	55.97	0.04	24249.3	57.94	0.03	25560.7	640765
9830.0	3549.292	171.6920	-5.5526	55.91	0.04	24249.3	57.88	0.03	25560.6	640827
9840.0	3549.316	172.2277	-5.1913	55.85	0.03	24249.2	57.82	0.03	25560.5	640892
9850.0	3549.341	172.7628	-4.8295	55.80	0.03	24249.2	57.77	0.03	25560.4	640962
9860.0	3549.364	173.2972	-4.4672	55.75	0.03	24249.1	57.73	0.03	25560.3	641035
9870.0	3549.388	173.8311	-4.1045	55.70	0.03	24249.0	57.68	0.03	25560.2	641112
9880.0	3549.411	174.3644	-3.7414	55.66	0.03	24249.0	57.64	0.03	25560.1	641192
9890.0	3549.434	174.8972	-3.3778	55.62	0.03	24248.9	57.61	0.03	25560.0	641277
9900.0	3549.457	175.4296	-3.0140	55.59	0.03	24248.8	57.58	0.03	25559.9	641366
9910.0	3549.480	175.9616	-2.6498	55.56	0.03	24248.7	57.55	0.03	25559.8	641458
9920.0	3549.502	176.4933	-2.2854	55.53	0.03	24248.7	57.52	0.03	25559.7	641554
9930.0	3549.524	177.0246	-1.9208	55.51	0.03	24248.6	57.50	0.03	25559.6	641655
9940.0	3549.545	177.5558	-1.5560	55.49	0.03	24248.5	57.48	0.03	25559.5	641759
9950.0	3549.567	178.0867	-1.1910	55.47	0.03	24248.4	57.47	0.03	25559.4	641867
9960.0	3549.588	178.6174	-0.8259	55.46	0.03	24248.3	57.46	0.03	25559.3	641979
9970.0	3549.609	179.1481	-0.4607	55.46	0.03	24248.2	57.45	0.03	25559.2	642094
9980.0	3549.629	179.6786	-0.0955	55.45	0.03	24248.1	57.45	0.03	25559.1	642214
9990.0	3549.649	-179.7908	0.2697	55.45	0.03	24248.0	57.45	0.03	25559.0	642338
10000.0	3549.669	-179.2602	0.6349	55.46	0.03	24247.9	57.46	0.03	25558.8	642466
10010.0	3549.688	-178.7295	1.0000	55.47	0.03	24247.7	57.47	0.03	25558.7	642597
10020.0	3549.708	-178.1988	1.3651	55.48	0.03	24247.6	57.48	0.03	25558.6	642732
10030.0	3549.727	-177.6678	1.7299	55.50	0.03	24247.5	57.49	0.03	25558.5	642872
10040.0	3549.745	-177.1366	2.0946	55.52	0.03	24247.3	57.51	0.03	25558.4	643015

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
10050.0	3549.764	-176.6052	2.4591	55.54	0.03	24247.2	57.53	0.02	25558.3	643161
10060.0	3549.782	-176.0735	2.8234	55.57	0.03	24247.0	57.56	0.02	25558.2	643312
10070.0	3549.799	-175.5414	3.1873	55.60	0.03	24246.9	57.59	0.02	25558.1	643466
10080.0	3549.817	-175.0089	3.5509	55.64	0.02	24246.7	57.63	0.02	25558.0	643625
10090.0	3549.834	-174.4759	3.9142	55.68	0.02	24246.5	57.66	0.02	25557.8	643786
10100.0	3549.850	-173.9425	4.2771	55.72	0.02	24246.4	57.70	0.02	25557.7	643952
10110.0	3549.867	-173.4085	4.6395	55.77	0.02	24246.2	57.75	0.02	25557.6	644121
10120.0	3549.883	-172.8739	5.0015	55.82	0.02	24246.0	57.80	0.02	25557.5	644294
10130.0	3549.899	-172.3387	5.3629	55.88	0.02	24245.8	57.85	0.02	25557.4	644470
10140.0	3549.914	-171.8029	5.7239	55.94	0.02	24245.6	57.91	0.02	25557.2	644650
10150.0	3549.930	-171.2663	6.0842	56.00	0.02	24245.4	57.97	0.02	25557.1	644833
10160.0	3549.945	-170.7289	6.4439	56.07	0.02	24245.2	58.03	0.02	25557.0	645020
10170.0	3549.959	-170.1907	6.8029	56.15	0.02	24245.1	58.10	0.02	25556.9	645210
10180.0	3549.973	-169.6516	7.1613	56.22	0.02	24244.9	58.17	0.02	25556.8	645403
10190.0	3549.987	-169.1117	7.5189	56.30	0.02	24244.7	58.24	0.02	25556.7	645600
10200.0	3550.001	-168.5707	7.8757	56.39	0.02	24244.5	58.32	0.02	25556.6	645800
10210.0	3550.015	-168.0288	8.2318	56.47	0.02	24244.4	58.40	0.02	25556.6	646003
10220.0	3550.028	-167.4858	8.5870	56.57	0.02	24244.2	58.49	0.02	25556.5	646209
S-IVB RESTART COMMAND										
10229.510	3550.040	-166.9685	8.9239	56.66	0.02	24244.2	58.57	0.02	25556.6	646408
10230.0	3550.041	-166.9418	8.9413	56.66	0.02	24244.2	58.58	0.02	25556.6	646419
10232.0	3550.043	-166.8328	9.0120	56.68	0.02	24244.2	58.60	0.02	25556.6	646461
10234.0	3550.046	-166.7238	9.0827	56.70	0.02	24244.2	58.61	0.02	25556.6	646503
10236.0	3550.048	-166.6148	9.1534	56.72	0.02	24244.2	58.63	0.02	25556.7	646546
10238.0	3550.051	-166.5057	9.2240	56.74	0.02	24246.1	58.65	0.02	25558.6	646588
10240.0	3550.053	-166.3965	9.2947	56.76	0.02	24266.6	58.67	0.02	25579.1	646631
10242.0	3550.056	-166.2872	9.3653	56.79	0.02	24304.2	58.69	0.02	25616.8	646675
10244.0	3550.059	-166.1776	9.4361	56.81	0.02	24346.9	58.71	0.02	25659.5	646721
10246.0	3550.062	-166.0677	9.5069	56.84	0.03	24393.3	58.73	0.02	25705.9	646769
10248.0	3550.066	-165.9576	9.5778	56.87	0.03	24439.7	58.75	0.03	25752.5	646820
10250.0	3550.070	-165.8472	9.6488	56.90	0.03	24486.3	58.78	0.03	25799.2	646874
10252.0	3550.074	-165.7366	9.7199	56.93	0.03	24533.0	58.81	0.03	25846.1	646929
10254.0	3550.078	-165.6256	9.7910	56.96	0.03	24580.2	58.83	0.03	25893.4	646985
10256.0	3550.083	-165.5144	9.8623	56.98	0.03	24627.9	58.84	0.03	25941.0	647042
10258.0	3550.088	-165.4030	9.9336	57.00	0.04	24674.3	58.86	0.03	25987.4	647102
10260.0	3550.094	-165.2912	10.0050	57.02	0.04	24722.6	58.88	0.04	26035.7	647165
10262.0	3550.099	-165.1792	10.0765	57.05	0.04	24771.0	58.90	0.04	26084.2	647232
10264.0	3550.106	-165.0669	10.1482	57.07	0.05	24819.7	58.92	0.04	26132.8	647302
10266.0	3550.113	-164.9544	10.2199	57.09	0.05	24868.4	58.93	0.05	26181.6	647377
10268.0	3550.121	-164.8415	10.2917	57.12	0.06	24917.4	58.95	0.06	26230.6	647457
10270.0	3550.130	-164.7284	10.3636	57.14	0.07	24966.6	58.97	0.06	26279.7	647543

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
10272.0	3550.140	-164.6150	10.4356	57.17	0.07	25015.8	58.99	0.07	26329.1	647636
10274.0	3550.152	-164.5013	10.5076	57.20	0.08	25065.2	59.02	0.08	26378.4	647735
10276.0	3550.164	-164.3873	10.5798	57.22	0.09	25114.5	59.04	0.09	26427.8	647843
10278.0	3550.178	-164.2731	10.6521	57.25	0.10	25163.9	59.06	0.09	26477.3	647958
10280.0	3550.193	-164.1585	10.7244	57.28	0.11	25213.5	59.08	0.10	26526.9	648082
10282.0	3550.209	-164.0437	10.7969	57.31	0.12	25263.4	59.10	0.11	26576.8	648216
10284.0	3550.228	-163.9286	10.8694	57.33	0.13	25313.4	59.13	0.12	26627.0	648359
10286.0	3550.248	-163.8132	10.9420	57.37	0.14	25363.6	59.15	0.14	26677.2	648513
10288.0	3550.269	-163.6975	11.0147	57.40	0.16	25413.8	59.18	0.15	26727.5	648679
10290.0	3550.293	-163.5815	11.0874	57.43	0.17	25464.2	59.21	0.16	26777.9	648856
10292.0	3550.318	-163.4651	11.1603	57.46	0.18	25514.6	59.23	0.17	26828.5	649045
10294.0	3550.346	-163.3485	11.2332	57.49	0.20	25565.3	59.26	0.19	26879.2	649247
10296.0	3550.376	-163.2316	11.3062	57.52	0.21	25616.0	59.29	0.20	26930.1	649463
10298.0	3550.408	-163.1144	11.3793	57.56	0.23	25667.0	59.31	0.22	26981.1	649694
10300.0	3550.443	-162.9969	11.4525	57.59	0.24	25718.0	59.34	0.23	27032.2	649939
10302.0	3550.480	-162.8791	11.5257	57.62	0.26	25769.2	59.37	0.25	27083.6	650199
10304.0	3550.520	-162.7609	11.5991	57.66	0.28	25820.7	59.40	0.26	27135.1	650476
10306.0	3550.562	-162.6425	11.6724	57.69	0.29	25872.4	59.43	0.28	27187.0	650769
10308.0	3550.607	-162.5237	11.7459	57.73	0.31	25924.5	59.46	0.30	27239.2	651080
10310.0	3550.655	-162.4046	11.8195	57.76	0.33	25976.8	59.49	0.32	27291.6	651410
10312.0	3550.707	-162.2853	11.8931	57.80	0.35	26029.3	59.52	0.34	27344.2	651758
10314.0	3550.761	-162.1655	11.9668	57.84	0.37	26081.9	59.55	0.36	27397.0	652125
10316.0	3550.819	-162.0455	12.0405	57.87	0.40	26134.5	59.58	0.38	27449.7	652512
10318.0	3550.880	-161.9251	12.1144	57.91	0.42	26187.2	59.61	0.40	27502.5	652920
10320.0	3550.944	-161.8045	12.1883	57.95	0.44	26240.0	59.65	0.42	27555.5	653350
10322.0	3551.012	-161.6835	12.2622	57.99	0.46	26292.9	59.68	0.44	27608.6	653801
10324.0	3551.084	-161.5621	12.3363	58.03	0.49	26346.0	59.71	0.46	27661.9	654276
10326.0	3551.160	-161.4405	12.4104	58.07	0.51	26399.4	59.75	0.49	27715.4	654773
10328.0	3551.240	-161.3185	12.4846	58.11	0.54	26453.0	59.78	0.51	27769.1	655295
10330.0	3551.323	-161.1962	12.5588	58.15	0.56	26506.7	59.82	0.54	27823.0	655842
10332.0	3551.411	-161.0735	12.6331	58.19	0.59	26560.7	59.85	0.56	27877.1	656414
10334.0	3551.503	-160.9505	12.7075	58.23	0.62	26614.8	59.89	0.59	27931.4	657013
10336.0	3551.600	-160.8272	12.7819	58.27	0.64	26669.1	59.92	0.61	27986.0	657639
10338.0	3551.701	-160.7035	12.8564	58.31	0.67	26723.8	59.96	0.64	28040.9	658292
10340.0	3551.806	-160.5795	12.9309	58.36	0.70	26778.9	60.00	0.67	28096.1	658974
10342.0	3551.917	-160.4551	13.0055	58.40	0.73	26834.3	60.04	0.70	28151.7	659686
10344.0	3552.032	-160.3304	13.0802	58.44	0.76	26889.9	60.07	0.73	28207.5	660427
10346.0	3552.152	-160.2053	13.1549	58.49	0.79	26945.7	60.11	0.76	28263.5	661199
10348.0	3552.278	-160.0799	13.2297	58.53	0.83	27001.7	60.15	0.79	28319.7	662003
10350.0	3552.409	-159.9541	13.3045	58.58	0.86	27057.7	60.19	0.82	28375.9	662839
10352.0	3552.545	-159.8280	13.3794	58.62	0.89	27113.7	60.23	0.85	28432.1	663708
10354.0	3552.687	-159.7015	13.4543	58.67	0.93	27169.9	60.27	0.88	28488.5	664610
10356.0	3552.834	-159.5747	13.5293	58.71	0.96	27226.3	60.31	0.92	28545.1	665548

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
10358.0	3552.987	-159.4475	13.6044	58.76	1.00	27283.0	60.35	0.95	28602.0	666520
10360.0	3553.146	-159.3199	13.6795	58.81	1.03	27339.9	60.39	0.98	28659.2	667529
10362.0	3553.311	-159.1920	13.7546	58.86	1.07	27397.1	60.44	1.02	28716.6	668575
10364.0	3553.483	-159.0637	13.8298	58.91	1.11	27454.3	60.48	1.06	28774.1	669658
10366.0	3553.660	-158.9350	13.9051	58.96	1.14	27511.7	60.52	1.09	28831.7	670780
10368.0	3553.844	-158.8060	13.9803	59.00	1.18	27569.0	60.57	1.13	28889.2	671941
10370.0	3554.035	-158.6766	14.0557	59.05	1.22	27626.5	60.61	1.17	28947.0	673143
10372.0	3554.232	-158.5468	14.1310	59.11	1.26	27684.3	60.65	1.20	29005.0	674385
10374.0	3554.436	-158.4167	14.2065	59.16	1.30	27742.5	60.70	1.24	29063.5	675670
10376.0	3554.647	-158.2862	14.2819	59.21	1.34	27801.0	60.75	1.28	29122.3	676997
10378.0	3554.865	-158.1553	14.3574	59.26	1.39	27859.9	60.79	1.32	29181.5	678367
10380.0	3555.091	-158.0240	14.4329	59.31	1.43	27919.0	60.84	1.36	29240.8	679783
10382.0	3555.324	-157.8923	14.5085	59.37	1.47	27978.3	60.89	1.41	29300.5	681243
10384.0	3555.565	-157.7602	14.5841	59.42	1.52	28037.9	60.94	1.45	29360.3	682750
10386.0	3555.813	-157.6278	14.6597	59.48	1.56	28097.8	60.98	1.49	29420.4	684303
10388.0	3556.069	-157.4950	14.7353	59.53	1.61	28157.8	61.03	1.54	29480.8	685905
10390.0	3556.333	-157.3617	14.8110	59.58	1.65	28218.0	61.08	1.58	29541.3	687555
10392.0	3556.605	-157.2281	14.8867	59.64	1.70	28278.5	61.13	1.62	29602.0	689255
10394.0	3556.885	-157.0941	14.9625	59.70	1.75	28339.2	61.18	1.67	29663.0	691005
10396.0	3557.174	-156.9597	15.0383	59.75	1.80	28400.0	61.23	1.72	29724.2	692807
10398.0	3557.472	-156.8248	15.1141	59.81	1.85	28460.9	61.28	1.76	29785.4	694661
10400.0	3557.778	-156.6896	15.1899	59.87	1.90	28521.8	61.33	1.81	29846.6	696568
10402.0	3558.093	-156.5540	15.2657	59.93	1.95	28582.9	61.39	1.86	29908.0	698529
10404.0	3558.417	-156.4180	15.3416	59.98	2.00	28644.2	61.44	1.91	29969.7	700545
10406.0	3558.750	-156.2815	15.4175	60.04	2.05	28705.9	61.49	1.96	30031.7	702617
10408.0	3559.092	-156.1447	15.4934	60.11	2.10	28767.8	61.55	2.01	30093.9	704746
10410.0	3559.444	-156.0074	15.5693	60.17	2.15	28829.8	61.60	2.06	30156.3	706933
10412.0	3559.806	-155.8698	15.6452	60.23	2.21	28891.9	61.66	2.11	30218.7	709178
10414.0	3560.177	-155.7317	15.7211	60.29	2.26	28954.2	61.71	2.16	30281.4	711483
10416.0	3560.559	-155.5932	15.7971	60.35	2.32	29016.7	61.77	2.22	30344.2	713849
10418.0	3560.950	-155.4543	15.8730	60.42	2.37	29079.5	61.83	2.27	30407.4	716276
10420.0	3561.352	-155.3149	15.9490	60.48	2.43	29142.5	61.89	2.32	30470.7	718766
10422.0	3561.764	-155.1752	16.0249	60.54	2.49	29205.7	61.94	2.38	30534.3	721329
10424.0	3562.186	-155.0350	16.1009	60.61	2.55	29269.2	62.00	2.44	30598.3	723938
10426.0	3562.620	-154.8944	16.1768	60.67	2.61	29333.1	62.06	2.49	30662.5	726621
10428.0	3563.064	-154.7534	16.2527	60.74	2.66	29397.4	62.12	2.55	30727.2	729371
10430.0	3563.520	-154.6119	16.3287	60.81	2.72	29461.8	62.18	2.61	30792.0	732189
10432.0	3563.986	-154.4700	16.4046	60.87	2.79	29526.3	62.25	2.67	30856.9	735075
10434.0	3564.464	-154.3277	16.4805	60.94	2.85	29591.1	62.31	2.72	30922.1	738031
10436.0	3564.954	-154.1849	16.5565	61.01	2.91	29656.1	62.37	2.78	30987.5	741056
10438.0	3565.455	-154.0417	16.6324	61.08	2.97	29721.4	62.43	2.84	31053.2	744154
10440.0	3565.969	-153.8981	16.7083	61.15	3.04	29786.9	62.49	2.91	31119.1	747324
10442.0	3566.494	-153.7540	16.7841	61.22	3.10	29852.7	62.56	2.97	31185.4	750567

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
10444.0	3567.031	-153.6095	16.8600	61.29	3.17	29919.0	62.62	3.03	31252.1	753885
10446.0	3567.581	-153.4645	16.9358	61.36	3.23	29985.7	62.69	3.09	31319.2	757278
10448.0	3568.144	-153.3191	17.0116	61.43	3.30	30052.5	62.75	3.16	31386.4	760748
10450.0	3568.719	-153.1732	17.0874	61.50	3.36	30119.3	62.82	3.22	31453.7	764296
10452.0	3569.307	-153.0269	17.1632	61.58	3.43	30186.3	62.89	3.29	31521.1	767923
10454.0	3569.909	-152.8801	17.2389	61.65	3.50	30253.6	62.95	3.35	31588.8	771629
10456.0	3570.523	-152.7329	17.3146	61.72	3.57	30321.2	63.02	3.42	31656.9	775416
10458.0	3571.152	-152.5852	17.3903	61.80	3.64	30389.2	63.09	3.49	31725.4	779286
10460.0	3571.793	-152.4370	17.4659	61.87	3.71	30457.5	63.16	3.55	31794.1	783238
10462.0	3572.449	-152.2884	17.5416	61.95	3.78	30526.0	63.23	3.62	31863.1	787274
10464.0	3573.118	-152.1394	17.6171	62.02	3.85	30594.8	63.30	3.69	31932.4	791396
10466.0	3573.802	-151.9899	17.6926	62.10	3.92	30663.9	63.37	3.76	32001.9	795604
10468.0	3574.500	-151.8399	17.7681	62.18	4.00	30733.3	63.44	3.83	32071.8	799899
10470.0	3575.212	-151.6894	17.8436	62.26	4.07	30803.2	63.51	3.90	32142.1	804282
10472.0	3575.940	-151.5385	17.9189	62.34	4.15	30873.5	63.58	3.97	32212.9	808755
10474.0	3576.682	-151.3871	17.9943	62.42	4.22	30944.1	63.66	4.05	32284.0	813319
10476.0	3577.439	-151.2352	18.0696	62.50	4.30	31014.9	63.73	4.12	32355.3	817974
10478.0	3578.211	-151.0828	18.1448	62.58	4.37	31086.0	63.81	4.19	32427.0	822722
10480.0	3578.999	-150.9300	18.2200	62.66	4.45	31157.7	63.88	4.27	32499.1	827564
10482.0	3579.803	-150.7767	18.2951	62.74	4.53	31229.9	63.95	4.34	32571.8	832501
10484.0	3580.622	-150.6228	18.3701	62.82	4.61	31302.5	64.03	4.42	32644.9	837534
10486.0	3581.457	-150.4686	18.4451	62.90	4.68	31375.6	64.11	4.49	32718.6	842665
10488.0	3582.309	-150.3138	18.5201	62.99	4.76	31449.1	64.18	4.57	32792.6	847894
10490.0	3583.177	-150.1585	18.5949	63.07	4.84	31523.0	64.26	4.65	32867.0	853224
10492.0	3584.061	-150.0027	18.6697	63.15	4.92	31597.1	64.34	4.72	32941.6	858653
10494.0	3584.963	-149.8465	18.7445	63.24	5.01	31671.3	64.42	4.80	33016.4	864185
10496.0	3585.881	-149.6897	18.8191	63.32	5.09	31745.8	64.50	4.88	33091.4	869820
10498.0	3586.816	-149.5325	18.8937	63.41	5.17	31820.6	64.58	4.96	33166.7	875558
10500.0	3587.768	-149.3747	18.9682	63.50	5.25	31895.7	64.66	5.04	33242.4	881402
10502.0	3588.738	-149.2165	19.0426	63.58	5.34	31971.3	64.74	5.12	33318.5	887352
10504.0	3589.726	-149.0577	19.1169	63.67	5.42	32047.3	64.82	5.20	33395.1	893409
10506.0	3590.731	-148.8985	19.1912	63.76	5.51	32123.9	64.91	5.28	33472.2	899576
10508.0	3591.755	-148.7387	19.2653	63.85	5.59	32200.9	64.99	5.37	33549.8	905852
10510.0	3592.797	-148.5784	19.3394	63.95	5.68	32278.3	65.07	5.45	33627.8	912239
10512.0	3593.857	-148.4177	19.4133	64.04	5.76	32356.2	65.16	5.53	33706.3	918738
10514.0	3594.936	-148.2564	19.4872	64.13	5.85	32434.6	65.24	5.62	33785.2	925350
10516.0	3596.034	-148.0945	19.5610	64.22	5.94	32513.5	65.33	5.70	33864.7	932077
10518.0	3597.150	-147.9322	19.6346	64.31	6.03	32592.9	65.42	5.78	33944.7	938919
10520.0	3598.286	-147.7693	19.7082	64.41	6.11	32672.8	65.50	5.87	34025.2	945877
10522.0	3599.441	-147.6059	19.7816	64.50	6.20	32753.1	65.59	5.96	34106.1	952953
10524.0	3600.616	-147.4420	19.8550	64.59	6.29	32833.8	65.68	6.04	34187.4	960148
10526.0	3601.810	-147.2776	19.9282	64.69	6.38	32915.0	65.77	6.13	34269.2	967462
10528.0	3603.024	-147.1126	20.0013	64.79	6.47	32996.7	65.86	6.22	34351.5	974898

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
10530.0	3604.259	-146.9471	20.0743	64.88	6.56	33078.7	65.95	6.30	34434.1	982456
10532.0	3605.513	-146.7811	20.1472	64.98	6.65	33161.1	66.04	6.39	34517.1	990134
10534.0	3606.787	-146.6145	20.2199	65.08	6.74	33243.9	66.13	6.47	34600.6	997934
10536.0	3608.081	-146.4474	20.2925	65.18	6.83	33327.3	66.23	6.56	34684.7	1005855
10538.0	3609.395	-146.2797	20.3650	65.28	6.92	33411.3	66.32	6.65	34769.3	1013900
10540.0	3610.731	-146.1115	20.4373	65.38	7.01	33495.9	66.42	6.73	34854.6	1022070
10542.0	3612.087	-145.9428	20.5095	65.49	7.10	33580.9	66.51	6.82	34940.2	1030367
10544.0	3613.464	-145.7735	20.5816	65.59	7.19	33666.2	66.61	6.91	35026.1	1038793
10546.0	3614.862	-145.6036	20.6535	65.69	7.29	33752.0	66.70	7.00	35112.6	1047349
10548.0	3616.282	-145.4333	20.7252	65.79	7.38	33838.4	66.80	7.10	35199.6	1056037
10550.0	3617.725	-145.2623	20.7969	65.89	7.48	33925.4	66.90	7.19	35287.3	1064858
10552.0	3619.189	-145.0908	20.8683	66.00	7.57	34013.1	66.99	7.28	35375.7	1073815
10554.0	3620.676	-144.9188	20.9397	66.10	7.67	34101.6	67.09	7.37	35464.8	1082907
S-IVB SECOND GUIDANCE CUTOFF										
10555.510	3621.813	-144.7885	20.9934	66.18	7.74	34168.7	67.16	7.44	35532.4	1089863
10556.0	3622.185	-144.7462	21.0108	66.20	7.77	34178.7	67.18	7.47	35542.5	1092137
10558.0	3623.715	-144.5733	21.0818	66.27	7.86	34170.8	67.25	7.56	35534.8	1101489
10560.0	3625.262	-144.4005	21.1525	66.33	7.96	34162.7	67.31	7.65	35527.1	1110948
10562.0	3626.827	-144.2276	21.2230	66.40	8.05	34154.6	67.38	7.74	35519.3	1120519
10564.0	3628.411	-144.0547	21.2932	66.47	8.14	34146.4	67.44	7.83	35511.4	1130198
TRANSLUNAR INJECTION										
10565.510	3629.618	-143.9242	21.3460	66.52	8.22	34140.1	67.49	7.90	35505.4	1137577
10600.0	3659.935	-140.9421	22.5119	67.73	9.82	33984.4	68.66	9.44	35355.7	1322779
10650.0	3712.942	-136.6306	24.0579	69.58	12.11	33716.9	70.45	11.62	35098.5	1646237
10700.0	3776.110	-132.3577	25.4261	71.52	14.33	33405.7	72.33	13.74	34799.2	2031338
10750.0	3848.758	-128.1504	26.6137	73.53	16.48	33057.2	74.28	15.78	34464.2	2473906
10800.0	3930.160	-124.0340	27.6233	75.57	18.55	32678.3	76.25	17.75	34100.2	2969523
10850.0	4019.575	-120.0308	28.4617	77.63	20.54	32275.4	78.24	19.62	33713.2	3513682
10900.0	4116.268	-116.1600	29.1388	79.68	22.45	31854.3	80.21	21.42	33309.0	4101902
10950.0	4219.520	-112.4366	29.6672	81.70	24.28	31420.3	82.14	23.12	32892.7	4729831
11000.0	4328.646	-108.8715	30.0607	83.67	26.02	30978.3	84.02	24.75	32469.0	5393319
11050.0	4443.004	-105.4720	30.3336	85.58	27.69	30532.4	85.84	26.29	32041.8	6088467
11100.0	4561.996	-102.2416	30.5003	87.43	29.29	30086.1	87.59	27.75	31614.4	6811658
11150.0	4685.073	-99.1806	30.5746	89.20	30.81	29642.0	89.25	29.13	31189.6	7559567
11200.0	4811.732	-96.2870	30.5693	90.90	32.27	29202.6	90.83	30.44	30769.4	8329165
11250.0	4941.522	-93.5567	30.4963	92.51	33.66	28769.6	92.33	31.69	30355.7	9117707
11300.0	5074.033	-90.9840	30.3661	94.06	34.99	28344.5	93.74	32.87	29949.6	9922723
11350.0	5208.899	-88.5624	30.1883	95.52	36.26	27928.1	95.07	33.98	29552.3	10741994
11400.0	5345.791	-86.2844	29.9711	96.92	37.48	27521.5	96.32	35.04	29164.3	11573539

TABLE C-VII. GEOGRAPHIC POLAR COORDINATES - SECOND BURN PHASE

TIME SEC	GC DIST NM	LONG DEG E	GC LAT DEG N	VEL-AZ DEG	VEL-EL DEG	EF VEL FT/S	HEAD DEG	FLT-PATH DEG	SF VEL FT/S	ALTITUDE FT
11450.0	5484.418	-84.1423	29.7218	98.24	38.65	27124.9	97.50	36.05	28786.2	12415589
11500.0	5624.519	-82.1284	29.4464	99.50	39.77	26738.9	98.60	37.01	28418.2	13266572
11550.0	5765.864	-80.2348	29.1504	100.70	40.85	26363.5	99.63	37.92	28060.5	14125090
11600.0	5908.247	-78.4541	28.8384	101.84	41.89	25998.9	100.59	38.78	27713.1	14989905
11650.0	6051.488	-76.7788	28.5140	102.93	42.89	25645.0	101.50	39.61	27376.0	15859919
11700.0	6195.426	-75.2020	28.1807	103.98	43.85	25301.7	102.35	40.39	27049.1	16734160
11750.0	6339.918	-73.7172	27.8411	104.98	44.78	24968.8	103.15	41.14	26732.0	17611769
11800.0	6484.841	-72.3181	27.4975	105.93	45.68	24646.1	103.90	41.86	26424.7	18491987
11850.0	6630.081	-70.9991	27.1517	106.86	46.55	24333.4	104.60	42.54	26126.8	19374142
11900.0	6775.543	-69.7547	26.8055	107.75	47.39	24030.4	105.26	43.20	25838.0	20257639
11950.0	6921.138	-68.5800	26.4600	108.61	48.21	23736.6	105.89	43.83	25558.0	21141953
12000.0	7066.790	-67.4703	26.1164	109.44	49.00	23451.9	106.47	44.43	25286.4	22026617
12050.0	7212.431	-66.4212	25.7755	110.25	49.78	23175.9	107.02	45.00	25023.0	22911220
SPACECRAFT SEPARATION SEQUENCE START										
12056.300	7230.778	-66.2932	25.7327	110.35	49.87	23141.7	107.09	45.08	24990.4	23022656
S-IVB/CSM PHYSICAL SEPARATION										
12059.300	7239.514	-66.2325	25.7124	110.40	49.92	23125.5	107.12	45.11	24974.9	23075719

TABLE C-VIII. FREE FLIGHT TRAJECTORY - S-IC STAGE

TIME SEC	EARTH-FIXED LAUNCH SITE POSITIONS XE FT	YE FT	ZE FT	EARTH-FIXED LAUNCH SITE VELOCITIES DXE FT/S	DYE FT/S	DZE FT/S	RANGE NM	ALTITUDE FT	LONG DEG E	LAT DEG N
160.0	231960	2139	340087	2869.9	18.6	7075.1	55.386	234694	-79.6019	28.8849
170.0	259117	2344	410753	2562.2	22.4	7059.5	66.803	263099	-79.3949	28.9414
180.0	283213	2588	481290	2257.3	26.4	7048.2	78.179	288673	-79.1882	28.9973
190.0	304268	2872	551719	1953.7	30.5	7037.6	89.523	311435	-78.9820	29.0526
200.0	322290	3197	622040	1650.8	34.7	7026.6	100.839	331391	-78.7759	29.1074
210.0	337286	3565	692249	1348.5	39.0	7015.1	112.131	348549	-78.5701	29.1615
220.0	349261	3977	762340	1046.6	43.4	7003.0	123.403	362912	-78.3643	29.2151
230.0	358220	4433	832306	745.2	47.9	6990.2	134.658	374484	-78.1586	29.2682
240.0	364166	4934	902142	444.1	52.5	6976.8	145.899	383267	-77.9529	29.3208
250.0	367103	5483	971840	143.2	57.2	6962.8	157.132	389264	-77.7471	29.3728
260.0	367032	6079	1041396	-157.5	62.0	6948.2	168.358	392477	-77.5412	29.4244
270.0	363954	6724	1110801	-458.1	67.0	6932.9	179.581	392905	-77.3350	29.4755
280.0	357870	7418	1180051	-758.7	72.0	6916.9	190.805	390550	-77.1286	29.5261
290.0	348780	8164	1249137	-1059.4	77.1	6900.3	202.034	385411	-76.9218	29.5763
300.0	336683	8961	1318055	-1360.2	82.3	6883.1	213.270	377486	-76.7147	29.6260
310.0	321576	9810	1386796	-1661.2	87.6	6865.1	224.517	366773	-76.5071	29.6753
320.0	303457	10713	1455355	-1962.6	93.0	6846.5	235.780	353270	-76.2989	29.7241
330.0	282323	11671	1523725	-2264.4	98.5	6827.2	247.060	336974	-76.0902	29.7726
340.0	258169	12684	1591898	-2566.6	104.1	6807.2	258.363	317880	-75.8808	29.8206
350.0	230990	13753	1659866	-2869.2	109.8	6786.3	269.691	295985	-75.6707	29.8682
360.0	200783	14879	1727618	-3172.1	115.5	6763.8	281.047	271283	-75.4598	29.9155
370.0	167550	16063	1795130	-3474.1	121.3	6737.5	292.432	243777	-75.2481	29.9624
380.0	131318	17304	1862328	-3770.4	126.9	6698.7	303.838	213488	-75.0358	30.0088
390.0	92217	18599	1928972	-4042.9	131.8	6618.7	315.230	180524	-74.8235	30.0546
400.0	50744	19930	1994261	-4224.2	133.7	6398.0	326.473	145302	-74.6137	30.0994
410.0	8976	21233	2055160	-4011.1	123.1	5618.9	337.043	109583	-74.4163	30.1409
420.0	-25941	22284	2102070	-2806.5	82.1	3571.5	345.254	79475	-74.2628	30.1729
430.0	-46807	22868	2126954	-1480.0	38.5	1590.9	349.658	61220	-74.1804	30.1899
440.0	-57984	23131	2137542	-849.8	17.1	661.9	351.573	51177	-74.1445	30.1972
450.0	-65239	23252	2142070	-660.2	8.7	307.6	352.433	44421	-74.1284	30.2004
460.0	-71619	23319	2144289	-619.9	5.1	151.0	352.902	38302	-74.1196	30.2022
470.0	-77648	23358	2145302	-585.3	2.8	59.9	353.169	32408	-74.1146	30.2032
480.0	-83301	23378	2145616	-544.9	1.4	8.1	353.314	26817	-74.1119	30.2037
490.0	-88549	23389	2145545	-505.2	0.6	-19.2	353.391	21589	-74.1104	30.2039
500.0	-93420	23393	2145280	-469.7	0.2	-32.1	353.429	16717	-74.1097	30.2040
510.0	-97958	23393	2144929	-438.6	-0.0	-37.2	353.447	12167	-74.1093	30.2040
520.0	-102202	23393	2144549	-410.5	-0.1	-38.4	353.456	7906	-74.1092	30.2040
530.0	-106178	23391	2144167	-385.4	-0.2	-37.7	353.460	3912	-74.1091	30.2040
540.0	-109922	23389	2143796	-364.0	-0.2	-36.4	353.462	150	-74.1090	30.2040
	S-IC STAGE IMPACT									
540.410	-110071	23389	2143781	-363.3	-0.2	-36.3	353.462	0	-74.1090	30.2040

TABLE C-IX. FREE FLIGHT TRAJECTORY - S-II STAGE

	EARTH-FIXED LAUNCH SITE POSITIONS			EARTH-FIXED LAUNCH SITE VELOCITIES						
TIME SEC	XE FT	YE FT	ZE FT	DXE FT/S	DYE FT/S	DZE FT/S	RANGE NM	ALTITUDE FT	LONG DEG E	LAT DEG N
540.0	-45567	84381	5361772	-5077.5	549.2	20370.1	865.831	631691	-64.3535	31.8573
560.0	-152471	95668	5767752	-5612.4	579.5	20226.2	932.918	633191	-63.0515	32.0082
580.0	-270044	107560	6170752	-6144.5	609.7	20072.2	1000.004	631790	-61.7452	32.1439
600.0	-398232	120053	6570571	-6673.8	639.7	19908.0	1067.108	627486	-60.4347	32.2644
620.0	-536977	133146	6967006	-7200.2	669.5	19733.8	1134.251	620281	-59.1199	32.3696
640.0	-686220	146834	7359857	-7723.6	699.2	19549.5	1201.450	610176	-57.8010	32.4593
660.0	-845901	161111	7748920	-8244.1	728.6	19355.1	1268.725	597171	-56.4781	32.5334
680.0	-1015962	175974	8133993	-8761.5	757.7	19150.6	1336.096	581270	-55.1512	32.5919
700.0	-1196341	191416	8514874	-9275.8	786.4	18935.8	1403.582	562474	-53.8204	32.6346
720.0	-1386974	207429	8891359	-9787.0	814.8	18710.9	1471.203	540787	-52.4859	32.6615
740.0	-1587800	224007	9263243	-10295.0	842.8	18475.8	1538.979	516212	-51.1477	32.6723
760.0	-1798751	241140	9630321	-10799.6	870.4	18230.3	1606.930	488753	-49.8060	32.6670
780.0	-2019762	258819	9992386	-11300.9	897.5	17974.4	1675.075	458414	-48.4608	32.6455
800.0	-2250764	277035	10349229	-11798.7	924.0	17708.1	1743.435	425202	-47.1123	32.6077
820.0	-2491687	295776	10700641	-12293.0	950.0	17431.3	1812.031	389121	-45.7606	32.5534
840.0	-2742458	315030	11046407	-12783.4	975.3	17143.5	1880.882	350179	-44.4059	32.4824
860.0	-3002987	334784	11386296	-13268.2	999.9	16842.6	1950.007	308383	-43.0484	32.3947
880.0	-3273027	355011	11719879	-13725.2	1021.9	16501.9	2019.382	263767	-41.6889	32.2903
900.0	-3550649	375557	12044764	-13955.3	1026.5	15892.7	2088.564	216598	-40.3368	32.1698
920.0	-3823164	395467	12346679	-12909.3	935.9	13885.1	2154.501	168677	-39.0518	32.0398
940.0	-4043196	411244	12575899	-8453.0	595.5	8429.1	2206.035	126952	-38.0504	31.9279
960.0	-4158287	419104	12684300	-3547.6	227.2	2995.1	2231.567	100070	-37.5552	31.8689
980.0	-4206230	421884	12718905	-1593.4	76.3	839.2	2240.845	82819	-37.3755	31.8467
1000.0	-4229807	422758	12726606	-874.1	19.9	58.5	2244.196	68737	-37.3106	31.8385
1020.0	-4244513	422920	12724536	-618.9	-0.5	-215.1	2245.390	55790	-37.2875	31.8355
1040.0	-4255089	422828	12719436	-453.0	-7.1	-273.1	2245.778	44287	-37.2800	31.8344
1060.0	-4263114	422671	12714086	-360.0	-8.1	-257.7	2245.879	34661	-37.2781	31.8341
1080.0	-4269772	422513	12709183	-309.4	-7.6	-232.1	2245.902	26392	-37.2776	31.8340
1100.0	-4275579	422369	12704797	-273.2	-6.8	-207.2	2245.908	19113	-37.2775	31.8339
1120.0	-4280759	422239	12700864	-245.8	-6.2	-186.8	2245.910	12608	-37.2775	31.8339
1140.0	-4285449	422121	12697298	-224.0	-5.6	-170.3	2245.912	6715	-37.2775	31.8338
1160.0	-4289748	422013	12694029	-206.6	-5.2	-157.1	2245.913	1313	-37.2775	31.8338
	S-II STAGE IMPACT									
1165.106	-4290793	421987	12693234	-202.8	-5.1	-154.3	2245.913	0	-37.2774	31.8338